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**Australian Institute of  
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# Health-care expenditure on cardiovascular diseases 2008–09



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*Authoritative information and statistics  
to promote better health and wellbeing*

# **Health-care expenditure on cardiovascular diseases 2008–09**

Australian Institute of Health and Welfare  
Canberra

Cat. no. CVD 65

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Please check the online version at <[www.aihw.gov.au](http://www.aihw.gov.au)> for any amendments.**

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# Abbreviations

ABS	Australian Bureau of Statistics
AHS	Australian Health Survey
AIHW	Australian Institute of Health and Welfare
AMI	Acute myocardial infarction
BEACH	Bettering the Evaluation and Care of Health
BoD	Burden of Disease
CHD	Coronary heart disease
COAG	Council of Australian Governments
CVD	Cardiovascular disease
GP	General Practitioner
ICD-10	International Classification of Diseases, 10 <sup>th</sup> edition
ICD-10-AM	International Classification of Diseases, 10 <sup>th</sup> edition, Australian Modification
MBS	Medicare Benefits Schedule
NEMESIS	North East Melbourne Stroke Incidence Study
NHCDC	National Hospital Cost Data Collection
NHMD	National Hospital Morbidity Database
NHS	National Health Survey
NPHEd	National Public Hospitals Establishments Database
PBS	Pharmaceutical Benefits Scheme
RPBS	Repatriation Pharmaceutical Benefits Scheme
WHO	World Health Organization

# Summary

Health-care expenditure for cardiovascular disease (CVD) is higher than for any other disease group and the impact of CVD on the health of Australians is considerable. This report draws upon data from the AIHW Disease Expenditure Database to provide a summary of health-care expenditure for CVD in Australia in 2008–09 as well as an overview of how this expenditure has changed in the last decade.

The report is based primarily on CVD expenditure for the following health-care sectors: hospital admitted patient services, out-of-hospital medical expenses and prescription pharmaceuticals.

## Main findings

- CVD has the highest level of health-care expenditure of any disease group in Australia, ranking it ahead of oral health, mental disorders and musculoskeletal conditions. In 2008–09, estimated expenditure for CVD, allocated by health-care sector, was \$7,605 million – 12% of all allocated health-care expenditure in Australia.
- CVD expenditure has remained relatively stable at around 12% of all health-care expenditure for the period 2000–01 to 2008–09.
- Coronary heart disease expenditure accounted for over one-quarter of CVD expenditure in 2008–09 (27%).
- Hospital admitted patient services accounted for most CVD expenditure (conservatively estimated at \$4,460 million), followed by prescription pharmaceuticals (\$1,648 million) and out-of-hospital medical expenses (\$1,497 million), in 2008–09.
- After adjusting for inflation, the biggest increase in annual CVD health-care expenditure from 2000–01 to 2008–09 was for hospital admitted patient services, which increased by 55%.





# 1 Introduction

The burden of cardiovascular disease (CVD; see Box 1.1) is high in Australia and continues, despite some major gains, to have a large impact on the health of Australians in terms of prevalence, mortality, morbidity and expenditure. It affected 3.4 million Australians in 2007–08 (17% of the population), is Australia's biggest killer, responsible for 48,456 deaths (34% of all deaths in 2008) and was the main reason for 474,200 hospitalisations (6% of all hospitalisations in 2008–09). CVD was also an additional, or secondary, diagnosis in a further 630,000 hospitalisations in Australia (ABS 2009; AIHW 2011).

## **Box 1.1: Definition of CVD and its causes**

CVD is a term used to describe many different conditions that affect the heart and blood vessels, with coronary heart disease (heart attack and angina) and stroke being the most common and serious types of CVD. The main underlying cause of CVD is a process known as atherosclerosis where abnormal deposits of fat, cholesterol and other substances build up in the inner lining of the arteries to form plaque. Atherosclerosis is most serious when it leads to reduced or blocked blood supply to the heart (causing angina or heart attack) or to the brain (causing stroke). A number of factors are known to increase the risk of developing CVD. These include tobacco smoking, high blood pressure, high blood cholesterol, insufficient physical activity, overweight and obesity, poor nutrition and diabetes (AIHW 2010) (see Appendix B for further details on CVD conditions and its risk factors).

In Australia, mortality rates for CVD have been falling since the 1960s (AIHW 2011). This can in part be attributed to improved diagnosis and treatment, including a marked increase in the use of statins, anti-hypertensive and anti-thrombolytic medications (Briffa et al. 2009), as well as reduced rates of smoking and improvements in the rates of high blood pressure (Taylor et al. 2006). Because CVD is strongly associated with age, the decline in mortality rates has resulted in an increasingly greater proportion of those with CVD belonging to older age groups where per person expenditure is highest. This combination of an ageing population, improved CVD survival and increased per person expenditure has put upward pressure on overall CVD expenditure.

This report aims to provide an overview of CVD expenditure by presenting health-care expenditure estimates for the treatment of CVD in 2008–09 and comparative information for the period 2000–01 to 2008–09. The term 'expenditure' used in this report refers to expenditure that can be allocated by disease and, as explained in the Methods and limitations chapter, this covers approximately 70% of total health-care expenditure in Australia.

CVD expenditure is presented by sex, age and type of CVD and is based primarily on expenditure for the health-care sectors: hospital admitted patient services, out-of-hospital medical expenses and prescription pharmaceuticals.

Coronary heart disease (CHD) and stroke are the most prevalent types of CVD and it is only for these diseases that expenditure can be specifically allocated. While other types of CVD, such as heart failure, rheumatic fever and rheumatic heart disease, peripheral vascular disease, hypertension, hypertensive heart disease consume 65% of total expenditure on CVD, data limitations mean it is not possible to analyse expenditure for these diseases individually and in this report they are treated collectively as 'Other CVD'.

## 2 Methods and limitations

Generally, the method for estimating disease expenditure is a 'top-down' approach where total expenditure across the health system is estimated and then allocated to the relevant conditions. Although this method yields consistency, good coverage and totals that add up to known expenditure, it is not as sensitive or accurate for any specific disease as a detailed 'bottom-up' analysis which would include the actual costs incurred by patients with that disease. In most cases however, a lack of data means a more granular 'bottom-up' analysis is not possible.

### The AIHW Disease Expenditure Database

The predominant source of information for this report is the AIHW Disease Expenditure Database. It provides a broad picture of the use of health system resources classified by disease group, and is a reference source for planners and researchers interested in costs and use patterns for particular disease groups. This information is also useful for comparing expenditure for different diseases and for ranking diseases by levels of expenditure.

Estimates in the Disease Expenditure Database are derived by combining information from the National Hospital Morbidity Database (NHMD), the National Public Hospitals Establishments Database (NPHED), the Health Expenditure Database, the National Hospital Cost Data Collection (NHCDC) and the Bettering the Evaluation and Care of Health (BEACH) survey.

The AIHW is continually seeking to improve the methods used to produce these estimates. As a consequence, disease expenditure estimates are subject to revision and the most recently published results may not be directly comparable with previously published data.

The Disease Expenditure Database contains estimates of expenditure by disease category, age group and sex for admitted patient hospital services, out-of-hospital medical expenses, prescription pharmaceuticals, optometrical and dental services, community mental health services and public health cancer screening.

A data quality statement for the Disease Expenditure Database can be found in Appendix C. It provides information on aspects of the quality of the data being reported by the AIHW and is included to help readers understand the limitations of the data and make informed judgments about their use of the data.

### Health-care expenditure exclusions and limitations

It is not possible to allocate all expenditure on health goods and services by disease. Expenditure that could not be allocated by disease includes: capital expenditure, non-admitted patient hospital services, over-the-counter drugs, other health practitioner services (except optometry), community health services expenditure (except community mental health), expenditure on public health programs (except cancer screening programs), health administration, health aids and appliances, and patient transport (ambulance). As a result, the estimates in this report are conservative as they are based on approximately 70% of total direct health expenditure that can be allocated by disease (AIHW 2010). Expenditure for residential aged care is not included in this report because it is categorised as welfare expenditure rather than health-care expenditure.

Treatments of dyslipidaemias, such as high blood cholesterol, are classified to the 'Endocrine, nutritional and metabolic disorders' chapter in the International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Australian Modification (ICD-10-AM). As these treatments are also used for the management of CVD this leads to an underestimation of the total expenditure on medicines used to prevent and treat CVD. Similarly, pathology tests for dyslipidaemias would be included in CVD expenditure only if the reason given for ordering the tests was a cardiovascular problem.

Readers need to bear in mind that cost-of-illness data provide estimates only of the impact a disease has on health-care expenditure. The estimates of the cost of treating and/or preventing a disease cannot be used to indicate the loss of health due to that disease, or to understand other effects, such as loss of productivity.

Care should be taken not to interpret expenditure associated with disease treatment as simply an estimate of the savings that would result from prevention of disease. Conversion of the opportunity cost – or the benefits forgone – of resources being devoted to disease treatment into expenditure savings involves a number of additional considerations. See, for example, Disease costing methodology used in the Disease Costs and Impact Study 1993–94 (AIHW: Mathers & Penm 1998).

## **Hospital admitted patient services**

Expenditure for hospital admitted patient services is based on hospital separations (episodes of care) using the principal diagnosis for each separation, with diagnosis information coded to the ICD-10-AM. No expenditure is allocated for additional diagnoses. In 2008–09, CVD was a principal diagnosis in 474,171 hospitalisations and an additional diagnosis in a further 629,882 hospitalisations, which suggests that expenditure for hospital admitted patient services is likely to be a conservative estimate of the true level of CVD-related expenditure.

In this report, expenditure was assigned to CVD when the principal diagnosis was between ICD-10-AM codes I0 and I99, inclusively. Within this range, expenditure was ascribed to CHD using the ICD-10-AM codes I20 to I25, to stroke using codes I60 to I64 and to Other CVD using the remaining codes. For further information about ICD-10-AM coding, refer to ICD version D (WHO 2010).

Grouping a large number of diseases for analytical purposes, as has been done with 'Other CVD', has the potential to mask expenditure patterns for individual diseases within this group.

Unless specifically assigned to CVD as a principal diagnosis, expenditure on complications of CVD, such as diabetes, or kidney disease, is allocated to those diseases and not included in CVD expenditure. If, for example, the principal diagnosis for a hospital separation was diabetes, with an additional diagnosis of CVD, then all the expenditure associated with that separation would be counted as expenditure for diabetes. The expenditure associated with treating CVD while that patient was in hospital would not be captured. By way of illustration, in 2008–09, 47% of hospitalisations with a principal diagnosis of diabetes had an additional diagnosis of CVD.

## **Out-of-hospital medical expenses and prescription pharmaceuticals**

Expenditure estimates for out-of-hospital medical expenses and prescription pharmaceuticals presented in this report are derived using the BEACH survey in conjunction

with data from other sources including the Medicare Benefits Schedule (MBS), Pharmaceutical Benefits Scheme (PBS), Repatriation Pharmaceutical Benefits Scheme (RPBS), and script volumes for private and under co-payment drugs. The BEACH data were collected by the Family Medicine Research Centre of the University of Sydney under a previous collaboration with the AIHW.

For out-of-hospital medical expenses, the BEACH survey data were aggregated over 3 years to ensure the sample size was sufficiently large to perform the analysis required. The aggregated data were used to estimate the proportion of general practitioner (GP) encounters in which CVD was a 'problem managed'. This proportion was then applied to the MBS data for the reference year. Based on this method, expenditure can be allocated for GP visits and referrals to medical specialists, pathology and imaging, referred to throughout this report as out-of-hospital medical expenses.

For prescription pharmaceuticals, the BEACH survey data were aggregated over 3 years to allocate expenditure on prescription drugs to each disease group based on the problems managed in the GP encounter that related to the prescribing of a particular drug. The Anatomical Therapeutic Chemical Classification System codes were mapped to codes for prescription drugs used in the BEACH survey.

The method for distributing prescription medicines expenditure by disease relies largely on general practice prescription data. For diseases where a significant proportion of prescriptions are made by medical specialists, as may be the case with CVD, this may not accurately reflect prescription medicine expenditure because it assumes that prescribing patterns for GPs and medical specialists are the same. This assumption was applied because there are no data that permit allocation of specialist-written prescriptions to diseases.

Time series comparisons for both out-of-hospital medical expenses and prescription pharmaceuticals should be treated with caution because GP prescription and referral patterns may have varied over time. Pharmaceuticals dispensed in hospitals were included in the estimates of hospital costs.

## **Per person and per service expenditure**

All per person calculations of expenditure in this report have been derived using the whole Australian population at 30 December 2008 as the denominator (ABS 2012). This method has been adopted because there are no reliable prevalence data for diagnosed CVD in Australia for 2007–08. Data from the NHS for that period were self-reported and regarded as insufficiently reliable. Using the whole population produces a valid economic measure which allows per person expenditure to be compared across diseases and with results from the earlier AIHW report 'Health-care expenditure on cardiovascular diseases 2004–05'. Per person expenditure results are published in chapter 5 of the report. If reliable prevalence data had been available for the period under study, an additional, and perhaps more useful, measure of per person expenditure could have been calculated for people who have CVD.

In chapter 6 of the report, per service expenditure for hospital admitted patients was analysed using the number of hospital separations as the denominator (where the principal diagnosis was CVD). Per service analysis was not undertaken for out-of-hospital medical expenses or prescription pharmaceuticals due to the lack of an appropriate administrative data source.

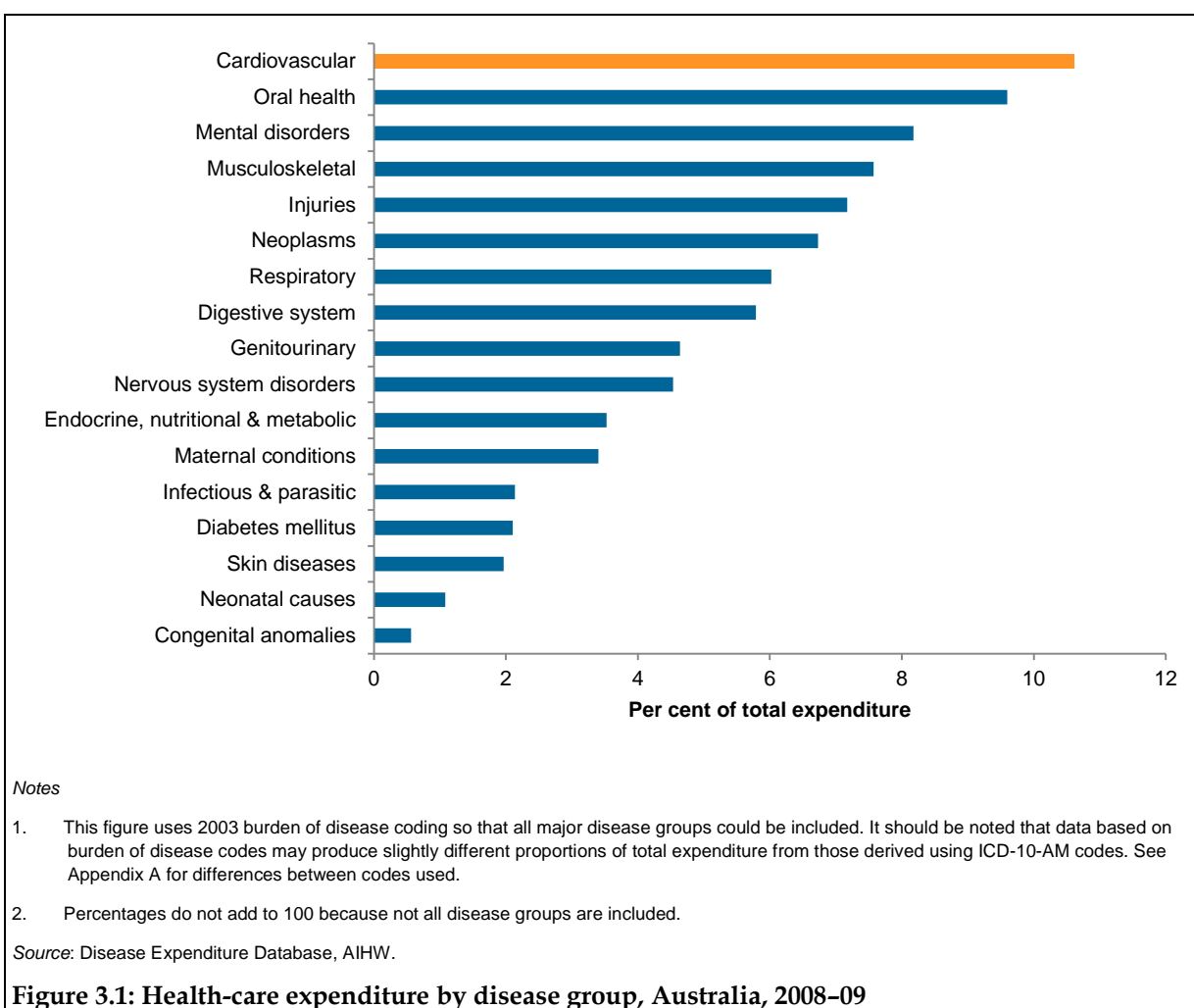
In this report 2003 Burden of Disease (BoD) coding was used to compare expenditure estimates for different disease groups. This was necessary because the ICD-10-AM coding,

which has been used for the balance of the report, could not be used in this instance (see appendix A for the codes used from both classifications) . The 2003 BoD estimates are being revised by the AIHW and new information describing BoD in Australia is expected to be finalised in 2015.

### 3 How much is spent on cardiovascular diseases?

#### Overall expenditure

In 2008–09, CVD accounted for 12% (\$7,605 million) of allocated health-care expenditure in Australia – more than any other disease group. This reflects the fact that CVD has long been one of the leading causes of disease and injury in Australia (AIHW: Begg et al. 2007). Oral health, mental disorders, musculoskeletal conditions, injuries and neoplasms were the next five disease groups ranked in order of allocated health-care expenditure, accounting for between 7% and 10% of such expenditure (Figure 3.1).



# Expenditure by health-care sector

## All cardiovascular diseases

### Hospital admitted patient services

The health-care sector with the highest level of CVD-related expenditure in 2008–09 was hospital admitted patient services (\$4,460 million), accounting for 59% of total health-care expenditure for CVD, the same proportion as for expenditure from all diseases. More than 474,000 separations with a principal diagnosis of CVD were captured in hospital admitted patient services with an average expenditure of \$9,406 for each separation (Table 3.1 and Table D7).

### Out-of-hospital medical expenses

Out-of-hospital medical expenses (\$1,497 million), accounted for a further 20% of total CVD health-care expenditure, slightly less than the proportion for all diseases (24%) (Table 3.1).

### Prescription pharmaceuticals

Estimated expenditure for prescription pharmaceuticals accounted for nearly one-quarter of total health-care expenditure for CVD (22% or \$1,648 million), a slightly higher proportion than for all diseases (16%) (Table 3.1).

**Table 3.1: Cardiovascular and all disease expenditure by health-care sector, Australia, 2008–09**

Health-care sector	Cardiovascular diseases		All diseases	
	\$ (million)	Per cent	\$ (million)	Per cent
Hospital admitted patient services	4,460	58.6	38,675	59.4
Out-of-hospital medical expenses	1,497	19.7	15,871	24.4
Prescription pharmaceuticals	1,648	21.7	10,583	16.2
<b>Total allocated expenditure</b>	<b>7,605</b>	<b>100.0</b>	<b>65,129</b>	<b>100.0</b>

#### Notes

1. Expenditure for hospital admitted patient services for cardiovascular diseases includes only cases where CVD was the principal diagnosis.
2. Out-of-hospital medical expenses and prescription pharmaceuticals are reliant on sample survey data that can vary from year to year.

Source: Disease Expenditure Database, AIHW.

## CHD, stroke and Other CVD

As noted in the Methods and limitations section of the report, separate analyses were undertaken for CHD and stroke only. All remaining types of CVD were considered collectively as 'Other CVD'.

The types of CVD with the highest health-care expenditure were CHD and stroke. CHD accounted for over one-quarter of CVD expenditure (27% or 2,028 million) and stroke a further 8% (\$606 million). The balance of \$4,971 million (65%) was spent on Other CVD (Table D1).



## Hospital admitted patient services

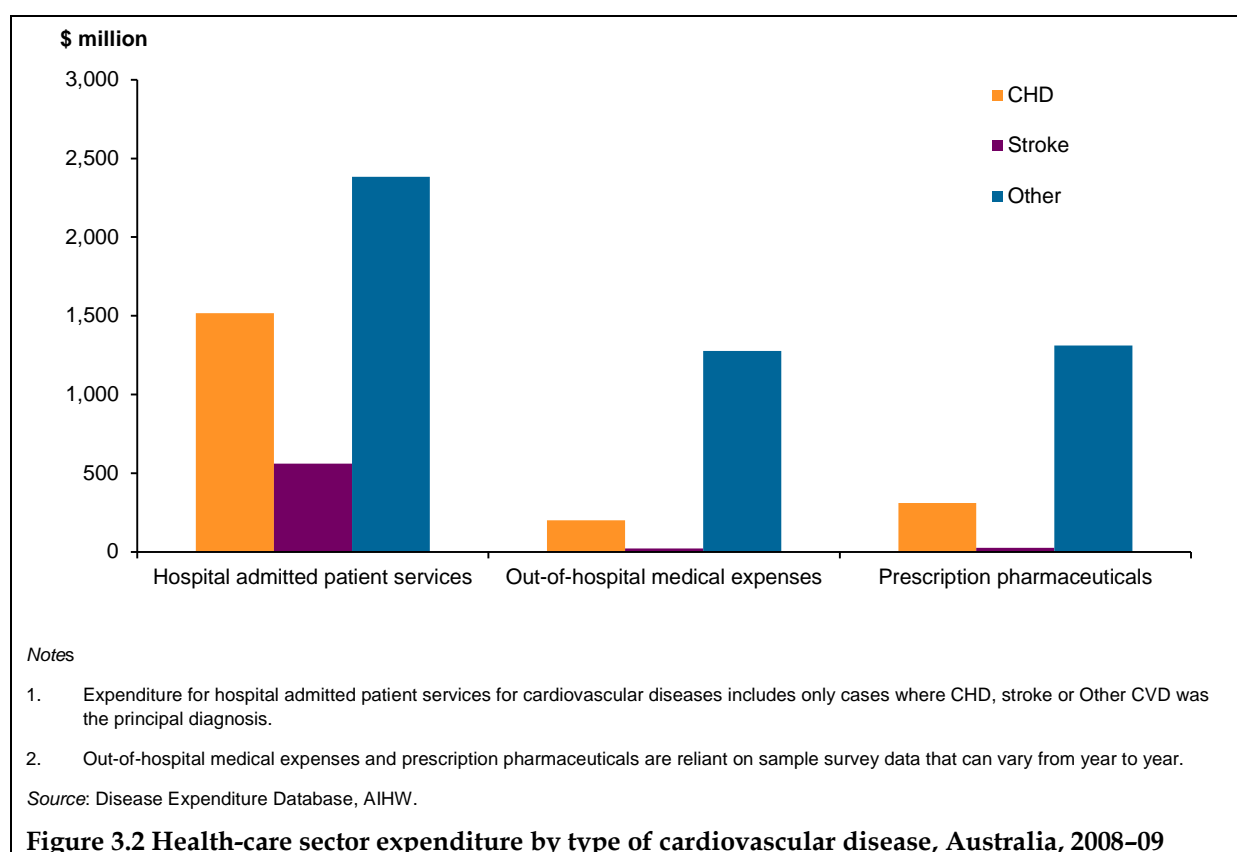
Hospital admitted patient services accounted for the highest level of health-care sector spending for CHD, stroke and Other CVD in 2008–09. The contribution of hospital admitted patient services to disease expenditure does vary by disease: 92% of total stroke expenditure compared with 75% for CHD and 48% for Other CVD (Figure 3.3 and Table D1). However, in absolute terms, hospital admitted patient services expenditure for stroke (\$560 million) was considerably lower than for CHD (\$1,517 million) and Other CVD (\$2,383 million) (Figure 3.2 and Table D1).

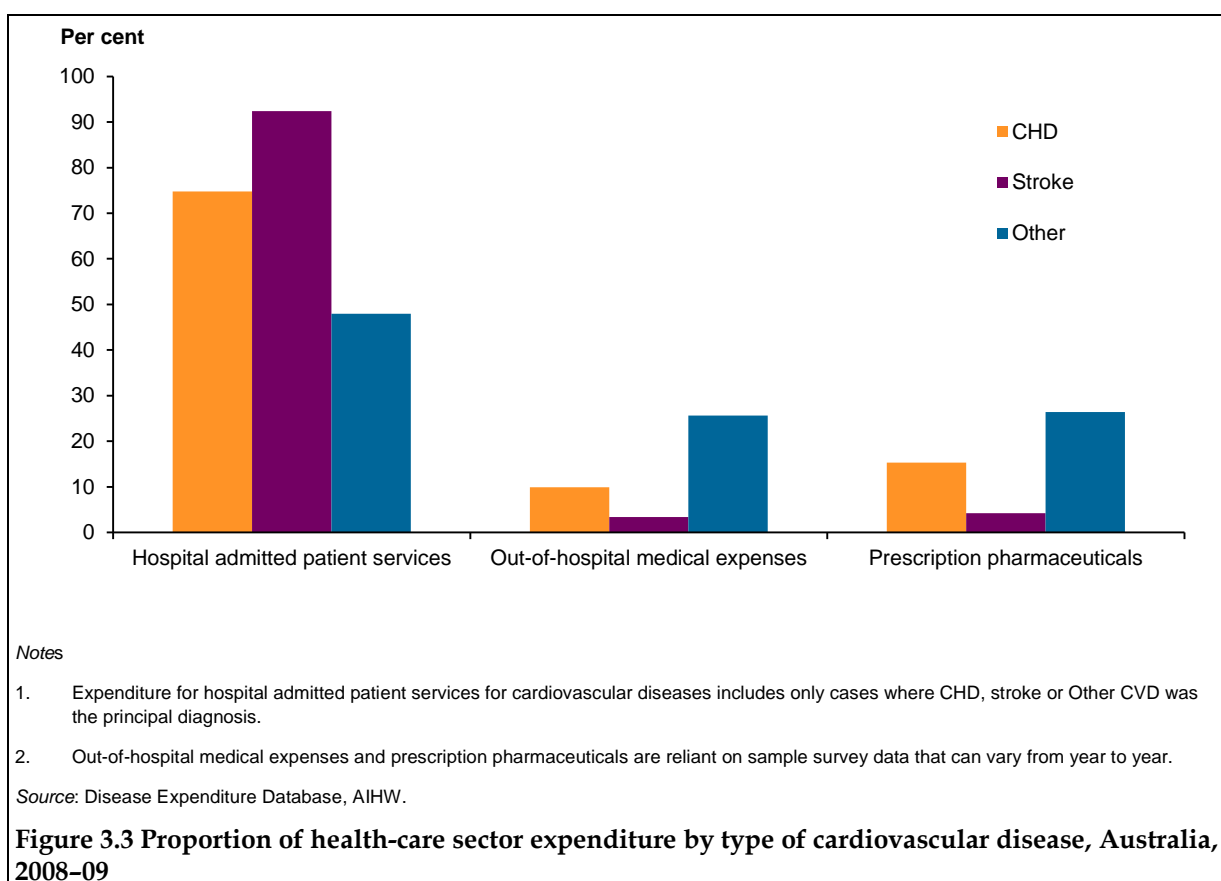
## Out-of-hospital medical expenses

In 2008–09, out-of-hospital medical expenses was the sector with the lowest expenditure for CHD, stroke and Other CVD. Over one-quarter of expenditure for Other CVD was allocated for out-of-hospital medical expenses (26% or \$1,276 million). For CHD and stroke the proportions were much lower, at 10% (\$201 million) and 3% (\$21 million) respectively (Figure 3.2, 3.3 and Table D1).

## Prescription pharmaceuticals

In 2008–09, prescription pharmaceuticals accounted for over one-quarter of expenditure for Other CVD (26% or \$1,311 million) but only 15% (\$311 million) of CHD expenditure and 4% (\$26 million) of that for stroke (Figure 3.2, 3.3 and Table D1).





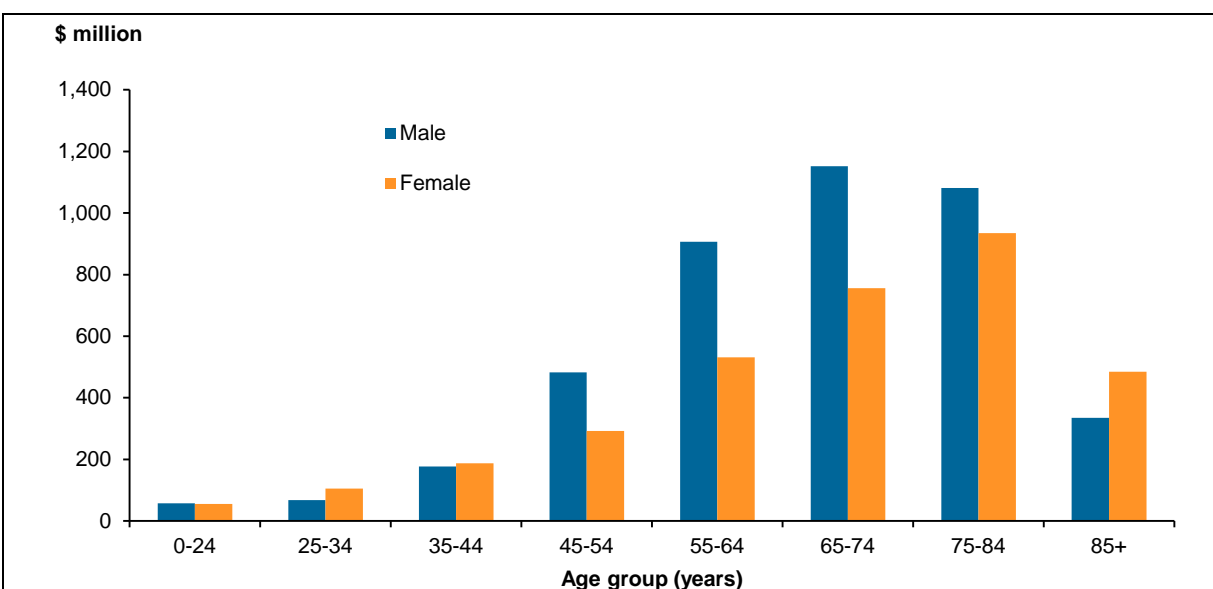
## 4 Expenditure by age and sex

### Box 4.1: Per person expenditure estimates

All per person calculations of expenditure in this report have been derived using the whole Australian population at 30 December 2008 as the denominator (ABS 2012). This method has been adopted because there are no reliable prevalence data for diagnosed CVD in Australia for 2007–08. This approach results in much lower per person costs than would have been the case if the numbers of people who had the disease (prevalence data) had been used. The method used here, however, does provide a valid economic measure of per capita expenditure that can be used to compare both individual diseases and results over time. See Methods and limitations chapter for more information.

### All cardiovascular diseases

In 2008–09, total allocated health-care expenditure for all CVD was \$4,259 million for males and \$3,347 million for females. Expenditure was relatively low and there were similar levels for males and females up to age 44. In each older age group up to 65–74 for males and 75–84 for females expenditure was progressively higher. For males 65–74 \$1,152 million was spent and for females 75–84 \$934 million was spent. Expenditure for those aged 85 and over declined substantially, although female expenditure (\$485 million) was considerably higher than for males (\$335 million), reflecting the greater longevity of women (Figure 4.1 and Table D2).

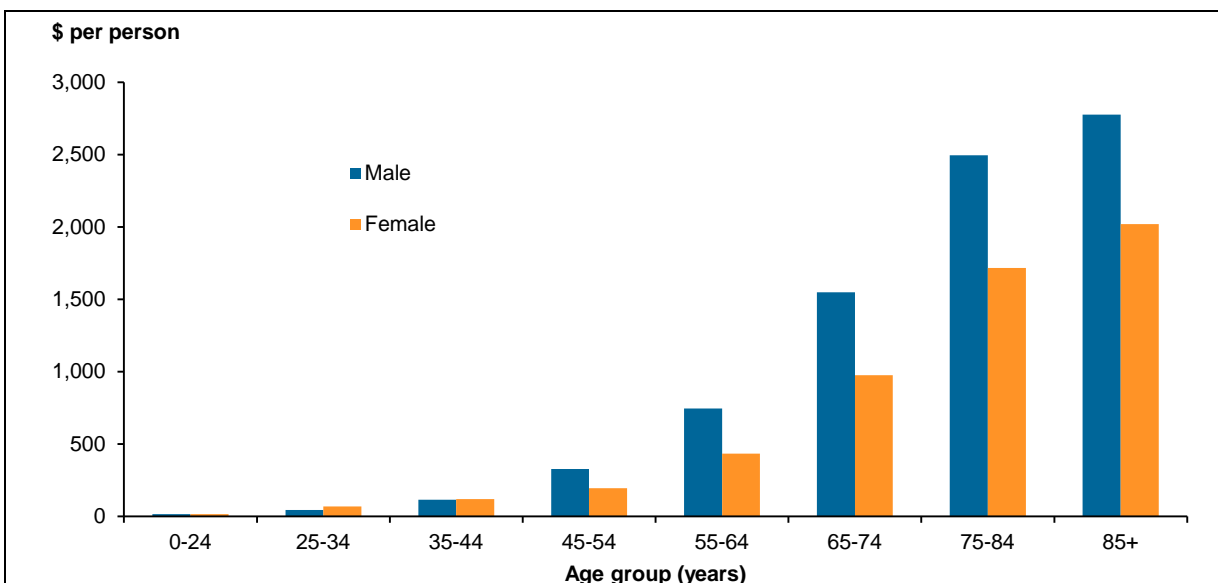


Source: Disease Expenditure Database, AIHW.

**Figure 4.1: Health-care expenditure for cardiovascular diseases, by age and sex, Australia, 2008–09**

Overall expenditure on CVD was \$352 per person in Australia in 2008–09. More was spent on males (\$397 per person) than on females (\$309). Per person expenditure was relatively low and similar for males and females until age 35–44, after which it was higher for men than women in all age groups. Per person expenditure was greatest for those 85 and over for both men (\$2,776) and women (\$2,020) (Figure 4.2, Table D6).

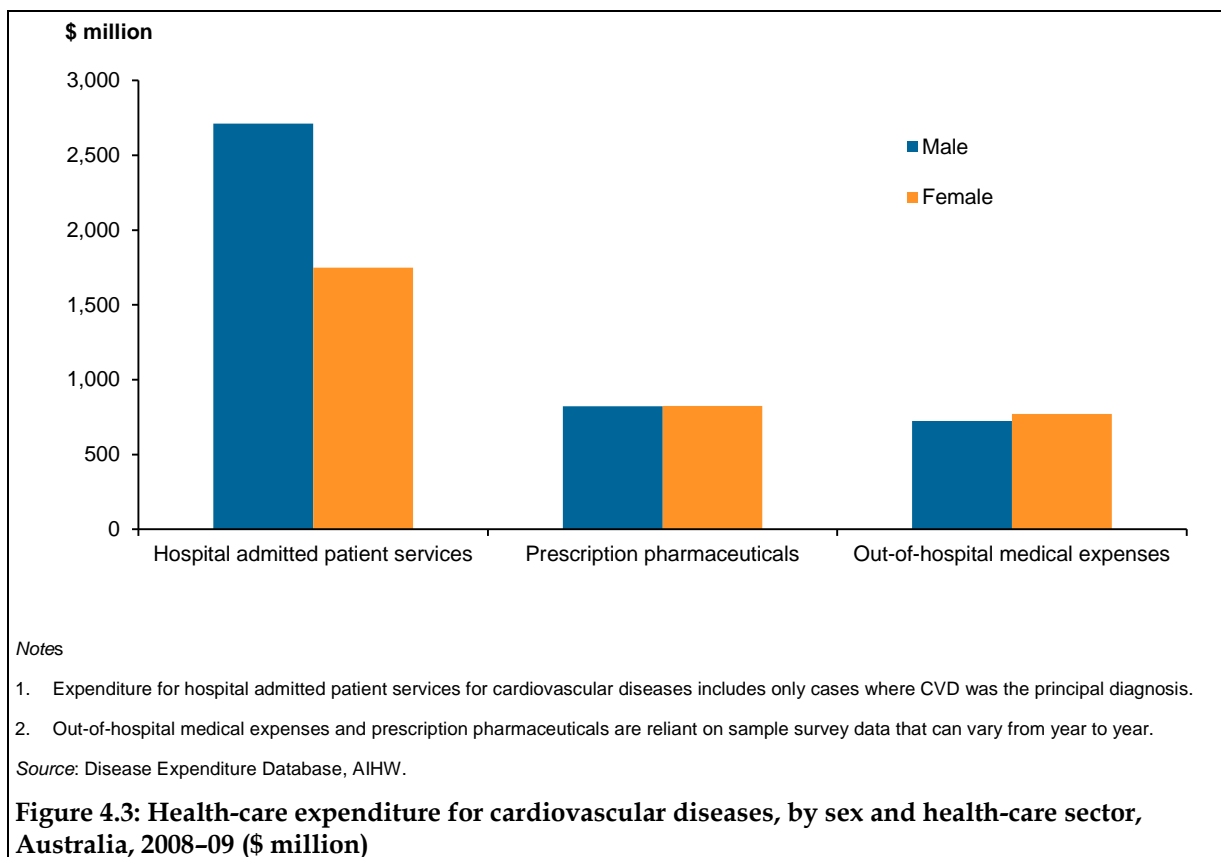
Despite people aged 85 and over having the highest level of per person expenditure (\$2,273), overall expenditure for this group was relatively low (\$820 million compared with \$2,015 million for those 75–84), a result of the smaller population in this age group (Table D2 and Table D6).



Source: Disease Expenditure Database, AIHW.

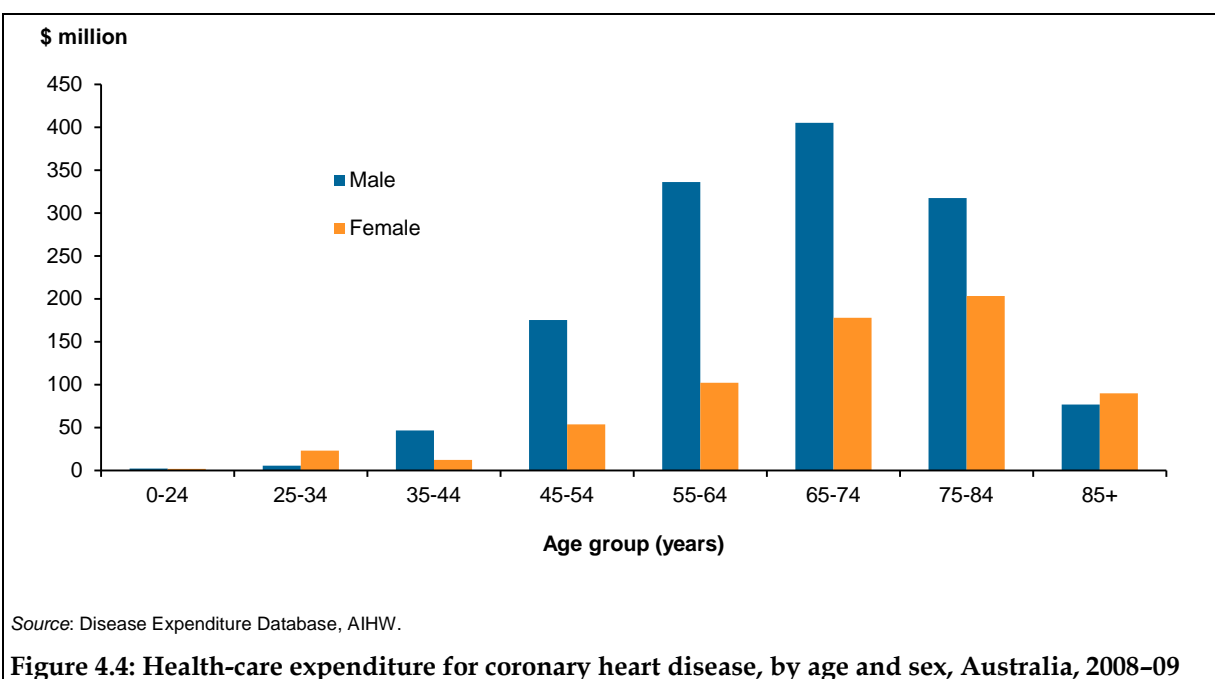
**Figure 4.2: Per person health-care expenditure for cardiovascular diseases, by age and sex, Australia, 2008–09**

Most of the difference in expenditure between males and females is related to hospital-admitted patient services. In 2008–09, the amount spent on hospital admitted patient services for males with CVD was 1.5 times as high as that spent for females (\$2,711 million vs \$1,749 million). This reflects the greater number of CVD hospitalisations for males (271,600) compared with females (202,600) in 2008–09. For prescription pharmaceuticals and out-of-hospital medical expenses however, similar amounts were spent on both sexes (Figure 4.3 and Table D2).



## Coronary heart disease

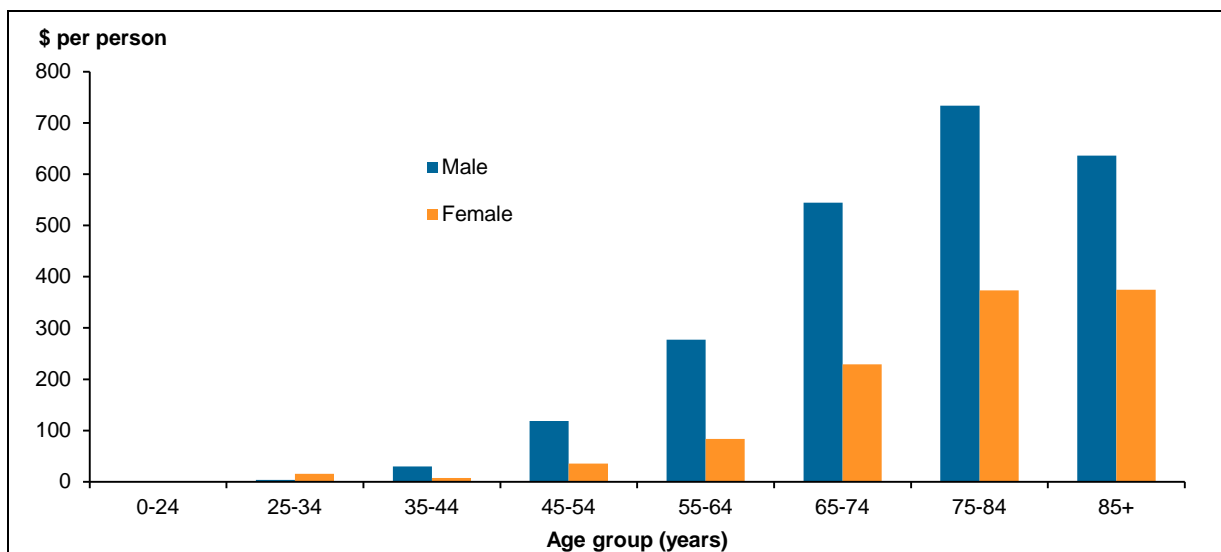
In 2008–09, total allocated health-care expenditure for CHD was \$1,365 million for males and \$663 million for females. Expenditure in each older group from age 35–44 was progressively higher for both sexes until age 65–74 for men and 75–84 for women. Expenditure was much higher for men than women between ages 35 and 84, however, at 85 and over it was slightly higher for women. Expenditure reached its highest level for males (\$405 million) at 65–74 and for females (\$203 million) at 75–84, showing a similar pattern to that for all CVD. While clearly less expenditure was reported for those aged 85 and over, in particular with male expenditure much lower than for those aged 75–84, expenditure for women (\$90 million) was greater than that for men (\$77 million) reflecting the larger numbers of women than men in this age group (Figure 4.4 and Table D3).



**Figure 4.4: Health-care expenditure for coronary heart disease, by age and sex, Australia, 2008–09**

Overall per person expenditure on CHD was \$94 in 2008–09. Over twice as much was spent on males (\$127) as females (\$61). Per person expenditure became progressively higher with each age group up to age 75–84 for men, and 85 and over for women, and was higher for men than women at 35–44 and each subsequent age group. Expenditure per person was greatest for males aged 75–84 (\$734) and for females aged 85 and over (\$375) (Figure 4.5 and Table D6).

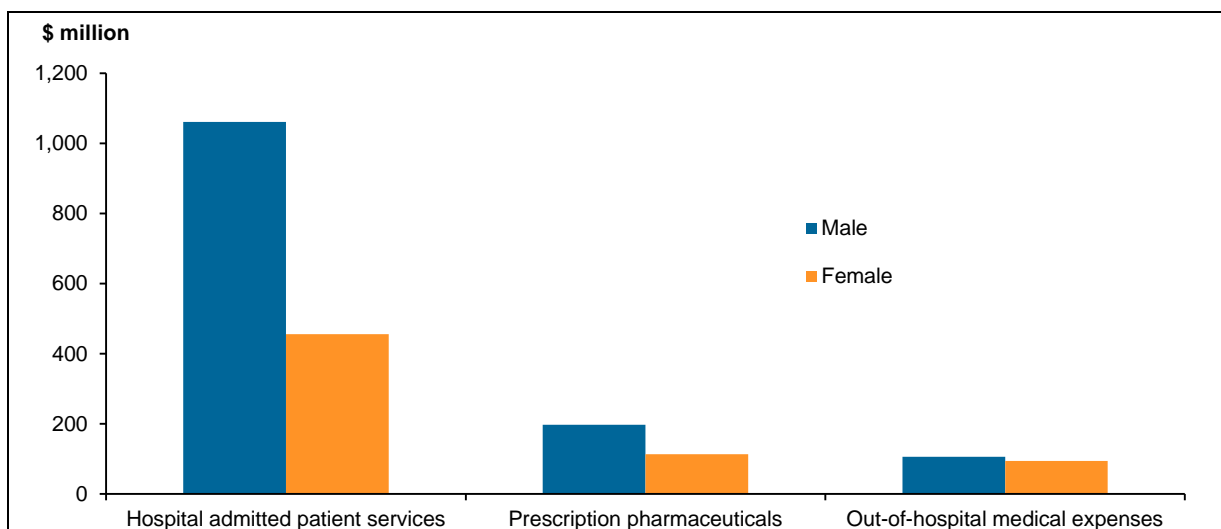
While much of the difference in expenditure between the sexes can be attributed to the higher rate of CHD among males (ABS 2009) it may also reflect differences in the diagnosis, treatment and care of coronary heart disease between males and females. Expenditure per hospital separation may provide a better picture of the difference between the sexes although it also shows a greater amount being spent for males (\$10,368) than females (\$8,685) (Table D7). More research in this area is required to better explain the differences in expenditure between males and females.



Source: Disease Expenditure Database, AIHW.

**Figure 4.5: Per person health-care expenditure for coronary heart disease by age and sex, Australia, 2008–09**

More was spent on males than females with CHD across each area of expenditure. This was especially true for hospital-admitted patients where over twice as much (\$1,061 million) was spent on males as on females (\$456 million). Expenditure on prescription pharmaceuticals for males (\$198 million) was almost twice as high as it was for females (\$113 million) while for out-of-hospital medical expenses the levels of expenditure were similar for both sexes (Figure 4.6, Table D3).



**Notes**

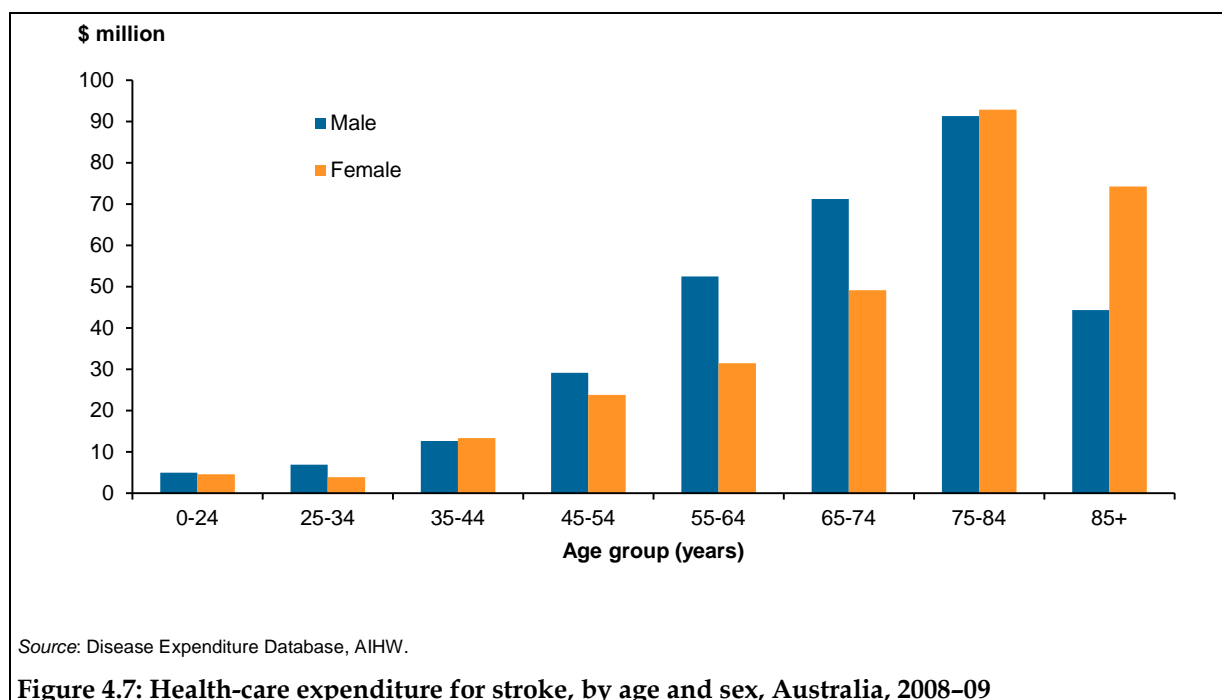
1. Expenditure for hospital admitted patient services for cardiovascular diseases includes only cases where CHD was the principal diagnosis.
2. Out-of-hospital medical expenses and prescription pharmaceuticals are reliant on sample survey data that can vary from year to year.

Source: Disease Expenditure Database, AIHW.

**Figure 4.6: Health-care expenditure for coronary heart disease by sex and health-care sector, Australia, 2008–09**

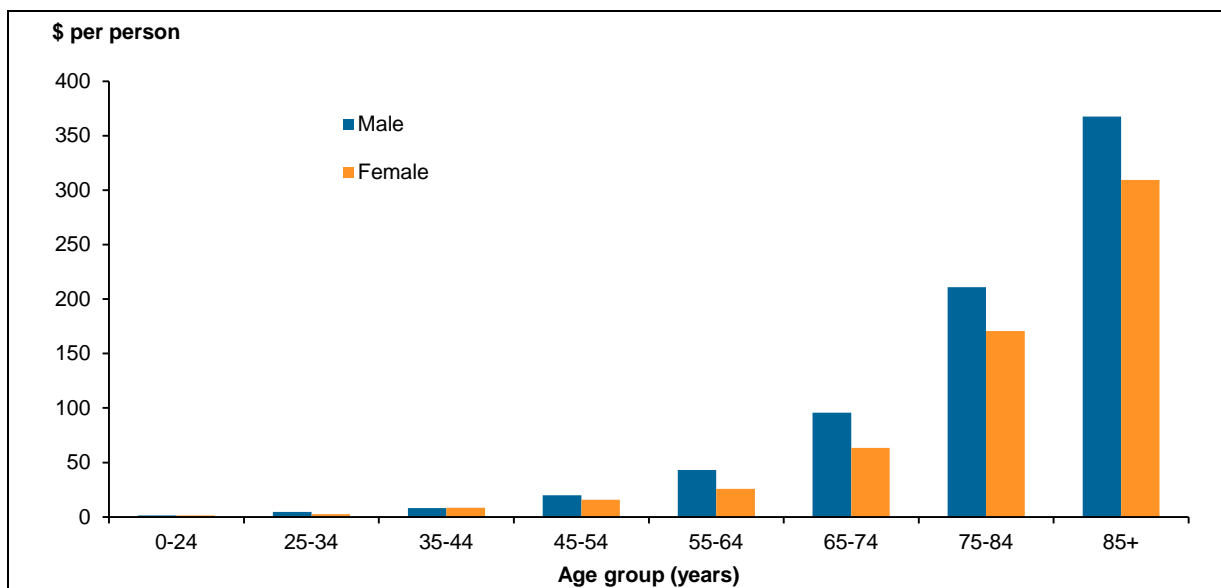
## Stroke

In 2008–09, total allocated health-care expenditure for stroke was \$313 million for males and \$293 million for females. Expenditure became progressively greater with age for both males and females up to age 75–84 where \$91 million was spent on men and \$93 million was spent on women. Expenditure was higher for men than for women between 45 and 74 years of age. Expenditure was lower for those aged 85 and over for both sexes, in particular for men (52% less than the amount spent on those aged 75–84). In this age group stroke expenditure for women (\$74 million) was 1.7 times as high as that for men (\$44 million), reflecting the smaller proportion of men aged 85 and over (Figure 4.7 and Table D4).



Overall per person expenditure on stroke was \$28 in 2008–09. Similar amounts were spent on males (\$29) and females (\$27). Per person expenditure remained quite low for both men and women until the 55–64 age group (under \$50) after which became progressively greater until age 85 and over when expenditure per person was \$367 for men and \$309 for women. This reflects the high prevalence of stroke among the oldest age group (Figure 4.8 and Table D6).

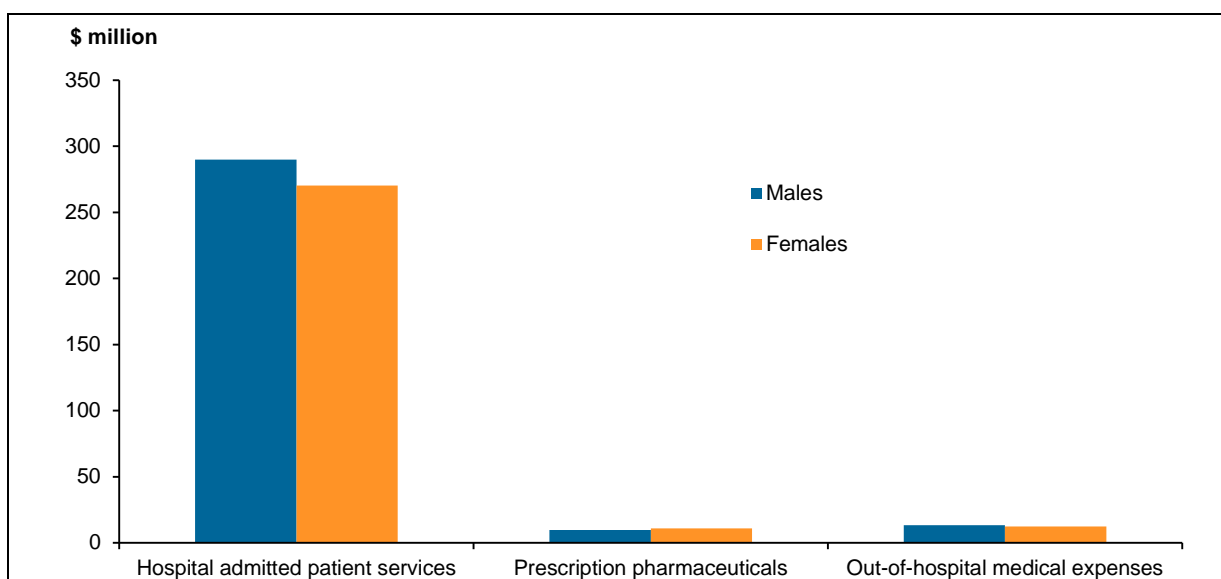




Source: Disease Expenditure Database, AIHW.

**Figure 4.8: Per person health-care expenditure for stroke, by age and sex, Australia, 2008-09**

By far the greatest amount of health-care expenditure for stroke (92%) was allocated for hospital admitted patient services with male expenditure (\$290 million) slightly higher than that for females (\$270 million). Expenditure for out-of-hospital medical expenses and prescription pharmaceuticals was similar for males and females but together accounted for only 8% of total stroke expenditure (Figure 4.9 and Table D4).



**Notes**

1. Expenditure for hospital admitted patient services for cardiovascular diseases includes only cases where stroke was the principal diagnosis.
2. Out-of-hospital medical expenses and prescription pharmaceuticals are reliant on sample survey data that can vary from year to year.

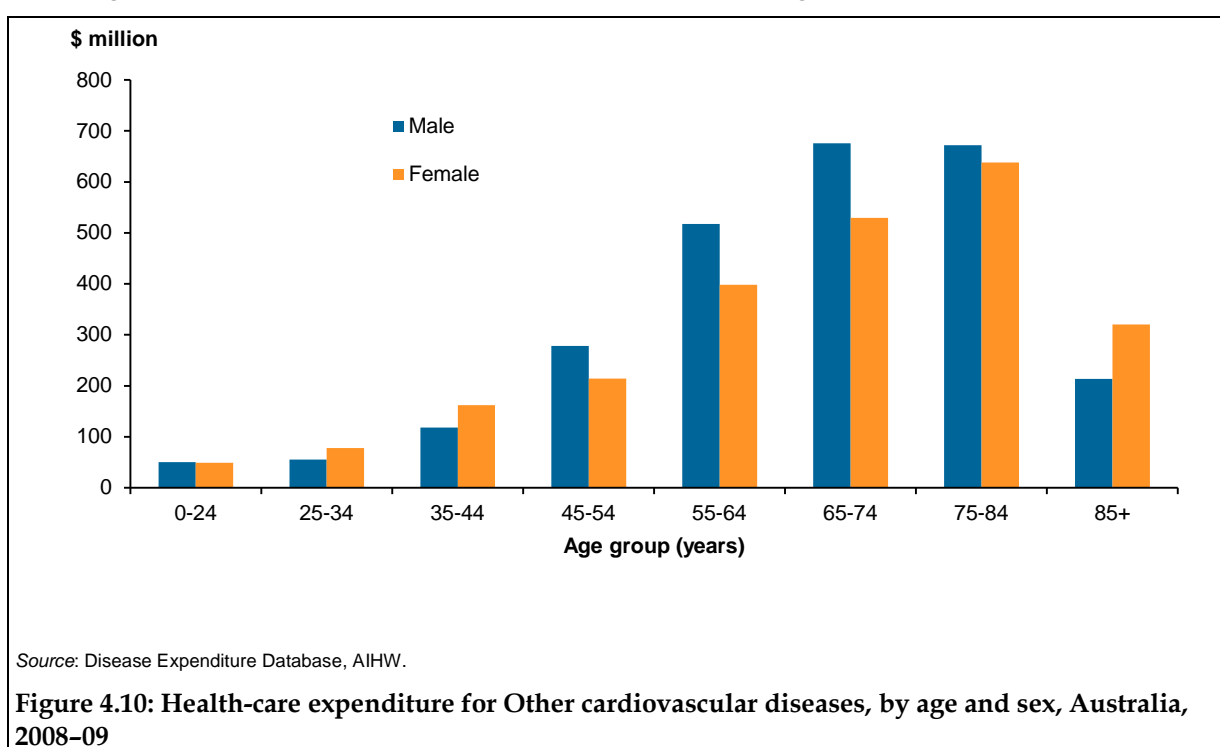
Source: Disease Expenditure Database, AIHW.

**Figure 4.9: Health-care expenditure for stroke, by sex and health-care sector, Australia, 2008-09**

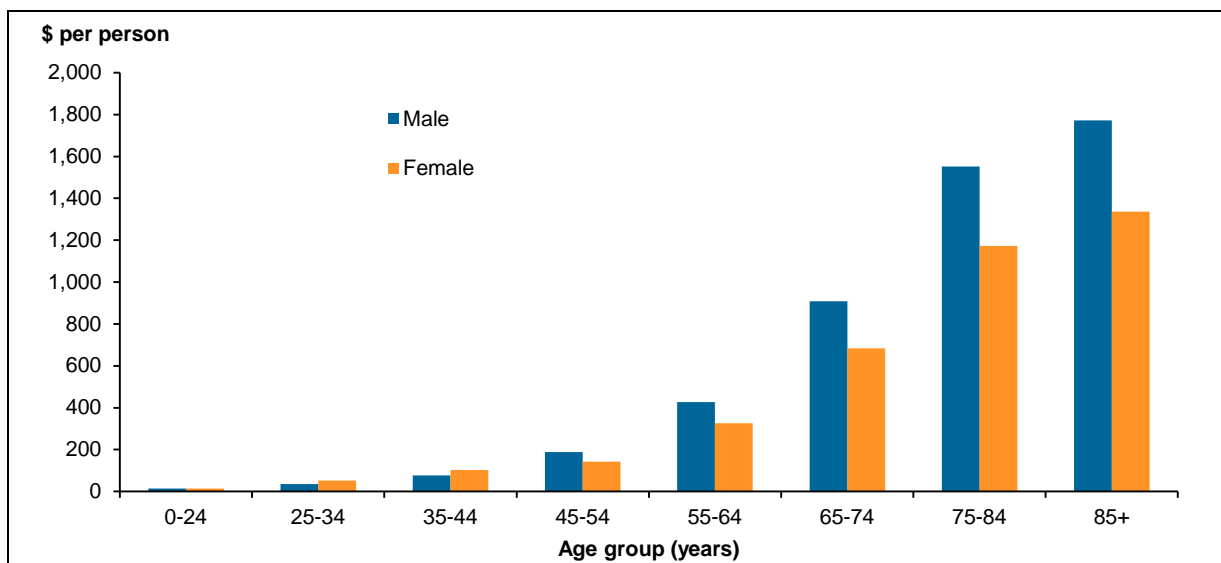
## Other cardiovascular diseases

In 2008–09, total allocated health-care expenditure for Other CVD – that is all cardiovascular diseases except CHD and stroke (see Appendix B) – was \$2,581 million for males and \$2,390 million for females. A higher proportion of health-care expenditure for Other CVD was spent in the 0–34 age group (5%) than for stroke (3%) or CHD (2%). This may be the result of the inclusion of diseases such as acute rheumatic fever and rheumatic heart disease which affect a proportionally higher number of younger people.

Expenditure became progressively greater with age from age 35–44 to 75–84, for both males and females. It was higher for men than women between the ages 45–84, after which expenditure was higher for women. The highest level of expenditure for men (\$676 million) was reached at 65–74 and at 75–84 for women (\$638 million). Expenditure was lower for those aged 85 and over, for males in particular (68% less) (Figure 4.10 and Table D5).



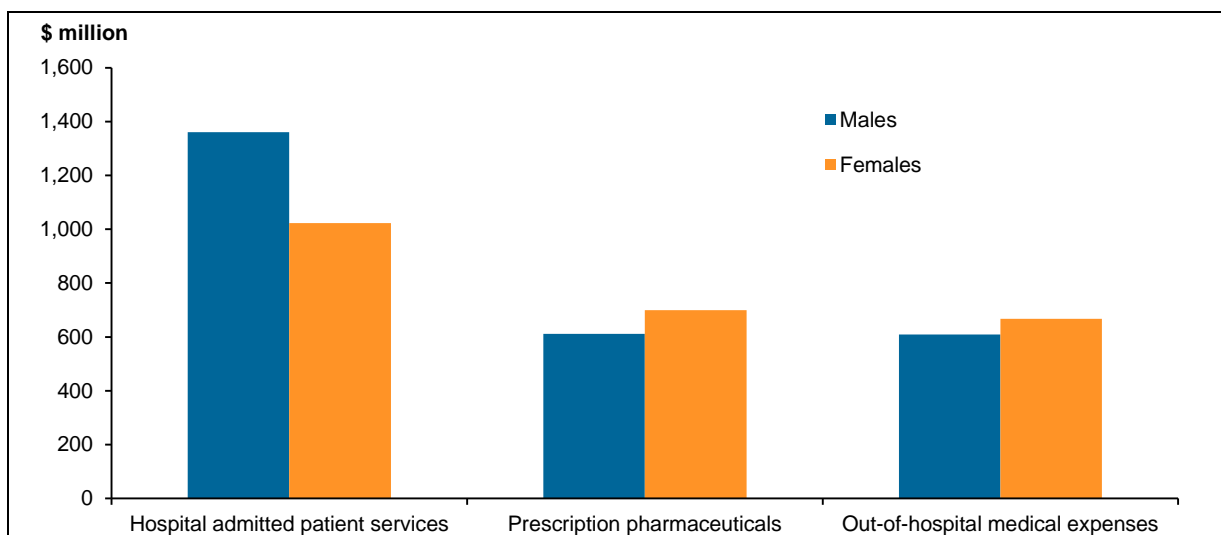
Overall per person expenditure on Other CVD was \$230 in 2008–09. More was spent on males (\$240) than on females (\$220). Per person expenditure for Other CVD became progressively higher from age 35–44 for both men and women. Expenditure per person was higher for men than for women from age 45–54 onwards. For both sexes the highest level of per person expenditure was for people aged 85 and over (\$1,772 for men and \$1,336 for women) (Figure 4.11 and Table D6).



Source: Disease Expenditure Database, AIHW.

**Figure 4.11: Health-care expenditure for Other cardiovascular diseases, per person, by age and sex, Australia, 2008-09**

Overall health-care expenditure for Other CVD was more evenly distributed across health sectors and by sex than it was for stroke or CHD. Hospital admitted patient services expenditure for males (\$1,360 million) was 1.3 times as high as it was for females (\$1,023 million). In contrast, expenditure on out-of-hospital medical expenses and prescription pharmaceuticals was slightly higher for females than for males. (Figure 4.12 and Table D5).



Notes:

1. Expenditure for hospital admitted patient services for cardiovascular diseases includes only cases where Other CVD was the principal diagnosis.
2. Out-of-hospital medical expenses and prescription pharmaceuticals are reliant on sample survey data that can vary from year to year.

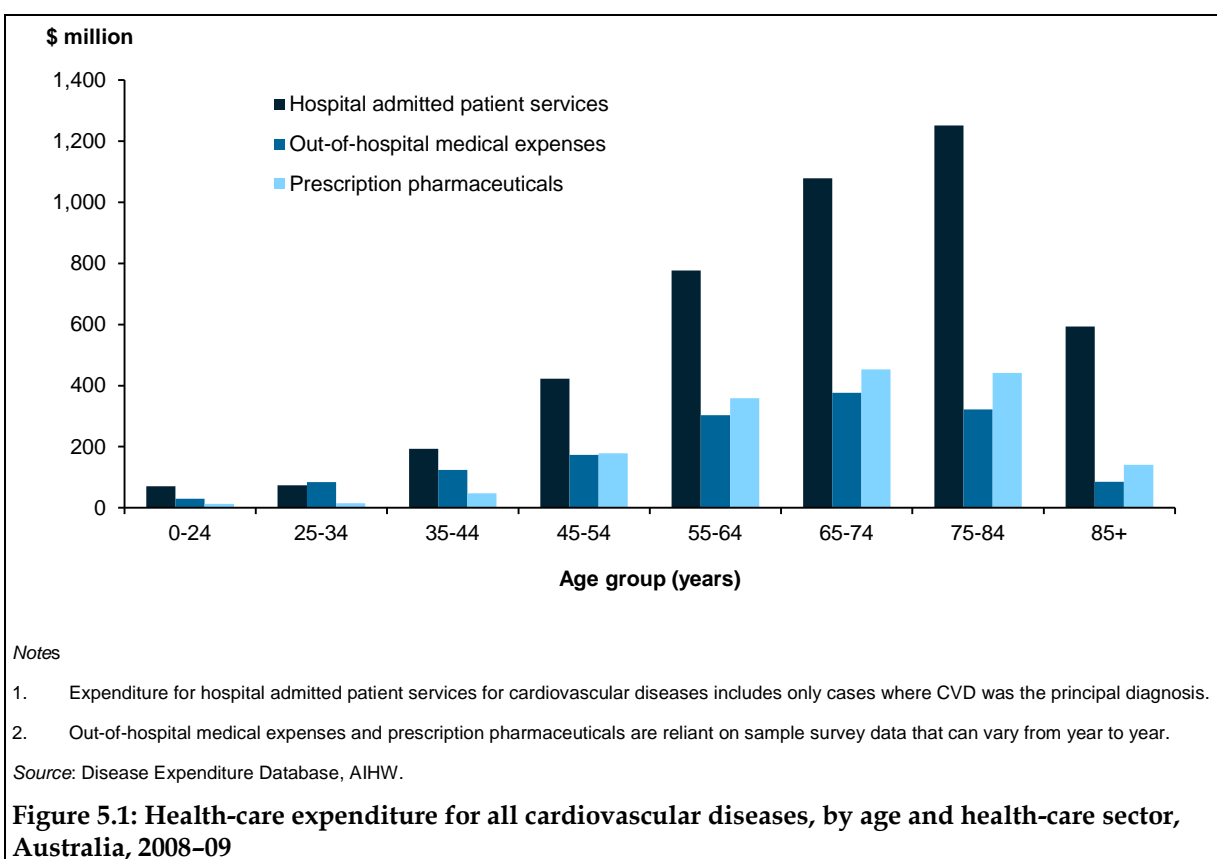
Source: Disease Expenditure Database, AIHW.

**Figure 4.12: Health-care expenditure for Other cardiovascular diseases, by area of expenditure and sex, Australia, 2008-09**

## 5 Where does the money go?

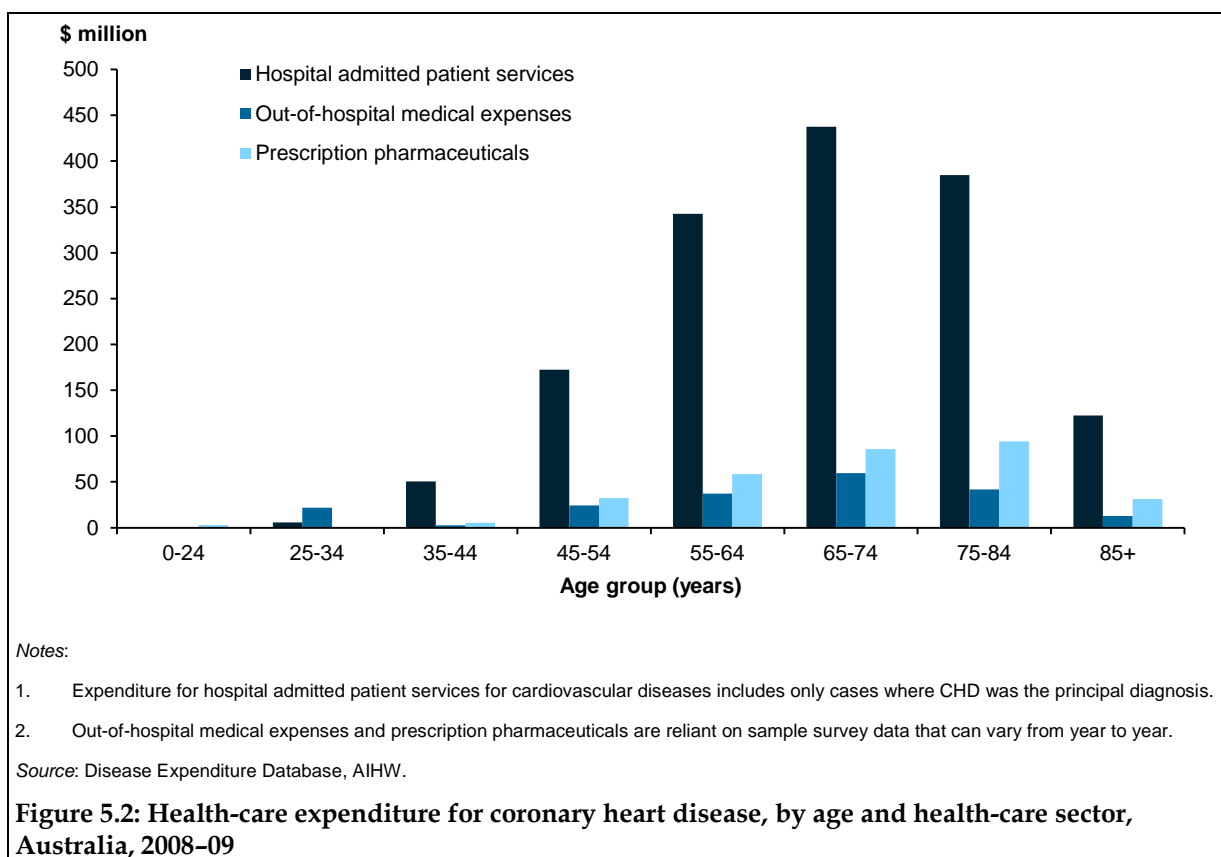
### All cardiovascular diseases

In 2008–09, health-care expenditure for all CVD, for people aged 34 years and below, was fairly similar for hospital admitted patients (\$144 million) and out-of-hospital medical expenses (\$114 million). Prescription pharmaceuticals required substantially less funding (\$28 million). This situation changed markedly after age 35 with expenditure for hospital admitted patients becoming progressively greater with age, until reaching \$1,252 million for those aged 75–84. Expenditure on out-of-hospital medical expenses was greatest at age 65–74 (\$377 million). Up to age group 25–34, expenditure for prescription pharmaceuticals was about a quarter of that for out-of-hospital medical expenses but by age 45–54 a similar amount was being spent on each. After age 45–54 expenditure for both was comparable in each age group, with the highest value being prescription pharmaceutical expenditure for those aged 65–74 (\$453 million) (Figure 5.1 and Table D2).



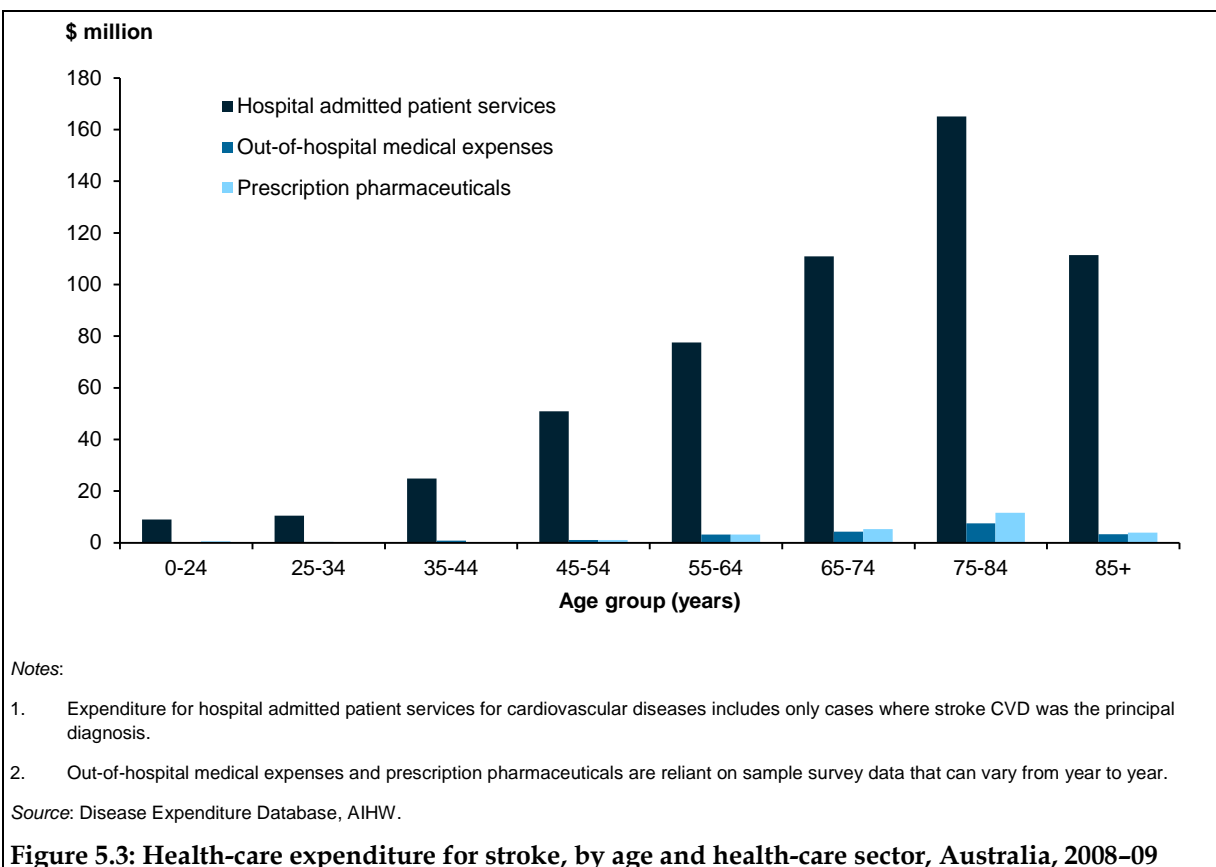
## Coronary heart disease

In 2008–09, CHD expenditure for hospital admitted patients, out-of-hospital medical expenses and prescription pharmaceuticals was relatively low until age 25–34. Thereafter expenditure on hospital admitted patient services was much greater than for the other two sectors. For those aged 35–44, hospital admitted patient expenditure was \$50 million (compared with \$3 million for out-of-hospital medical expenses and \$5 million for prescription pharmaceuticals). The greatest level of expenditure was \$438 million for the 65–74 age group while \$123 million was spent on those aged 85 or over. The highest expenditure for out-of-hospital medical expenses and prescription pharmaceuticals was \$60 million and \$94 million for age groups 65–74 and 75–84 respectively (Figure 5.2 and Table D3).



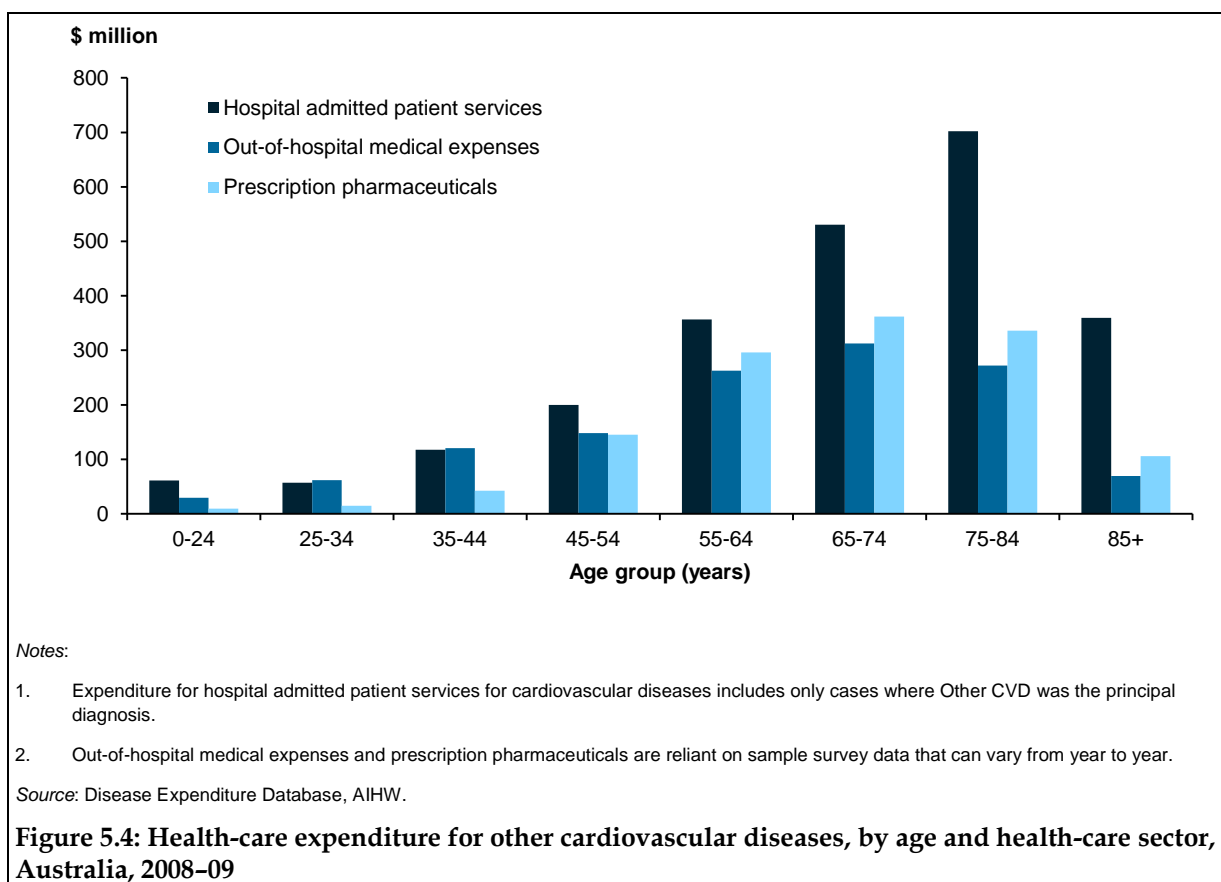
## Stroke

Among stroke patients, overall expenditure was highest for hospital admitted patients at all ages, 6-fold greater at age 75–84 (\$165 million) than at age 35–44 (\$25 million). Expenditure on out-of-hospital medical expenses and prescription pharmaceuticals remained comparatively low for all ages, with the highest expenditure at age 75–84 (\$8 million and \$12 million, respectively) (Figure 5.3 and Table D4).



## Other cardiovascular diseases

For Other CVD, estimated expenditure was similar for hospital admitted patient services and out-of-hospital medical expenses from ages 25 to 44. After this, hospital admitted patient expenditure was highest at age 75–84 (\$702 million) before nearly halving to \$360 million at age 85 or over. Up to age 35–44, prescription pharmaceuticals expenditure was about a third of that for the other two sectors but by 45–54 it had reached the same level of expenditure as out-of-hospital medical expenses. Expenditure for out-of-hospital medical expenses and prescription pharmaceuticals became progressively higher thereafter to maximums of \$313 million and \$362 million at age 65–74. At age 85 and over, out-of-hospital medical expenses was much lower at \$69 million and prescription pharmaceuticals expenditure had fallen to \$106 million (Figure 5.4 and Table D5).



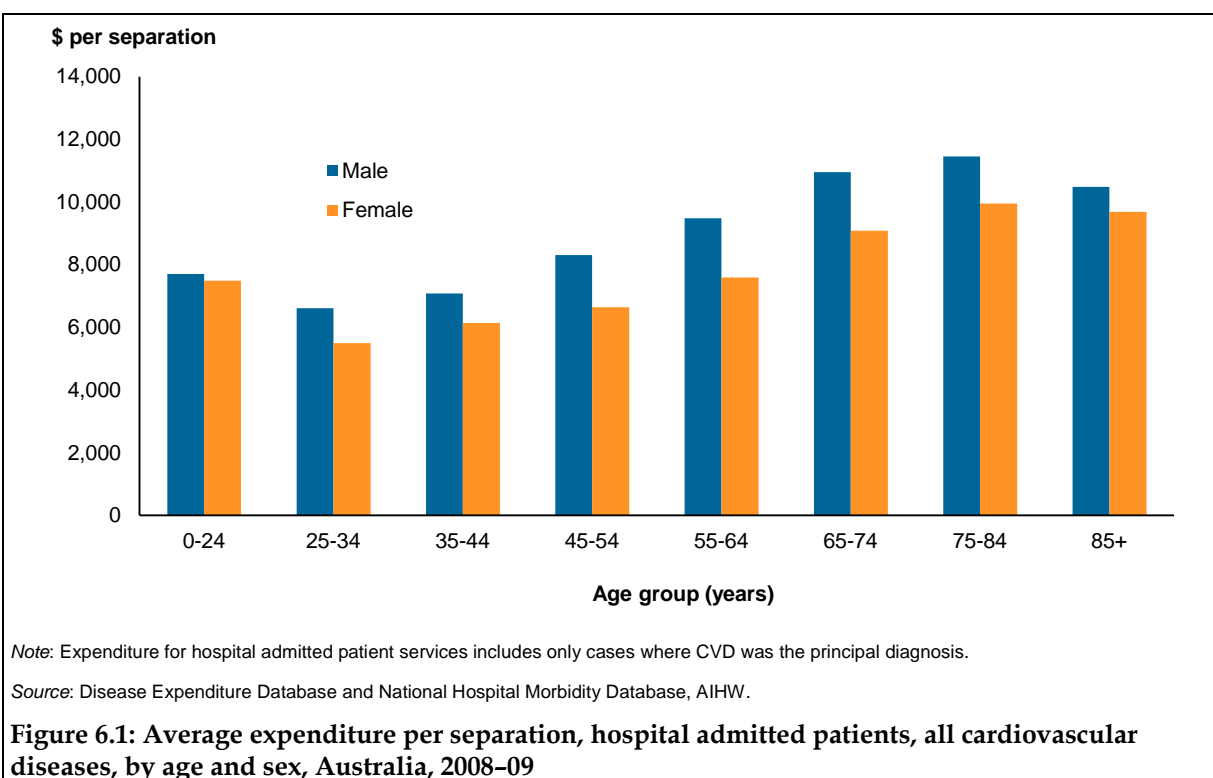
## 6 Expenditure per hospitalisation

### Box 6.1 Per separation expenditure estimates

In this chapter the number of hospital separations with a principal diagnosis of CVD is used as the denominator to calculate 'per separation' costs for hospital admitted patient services (see 'separation' in glossary). Information has not been presented for out-of-hospital medical expenses and prescription pharmaceuticals because there is no appropriate administrative data source.

### All cardiovascular diseases

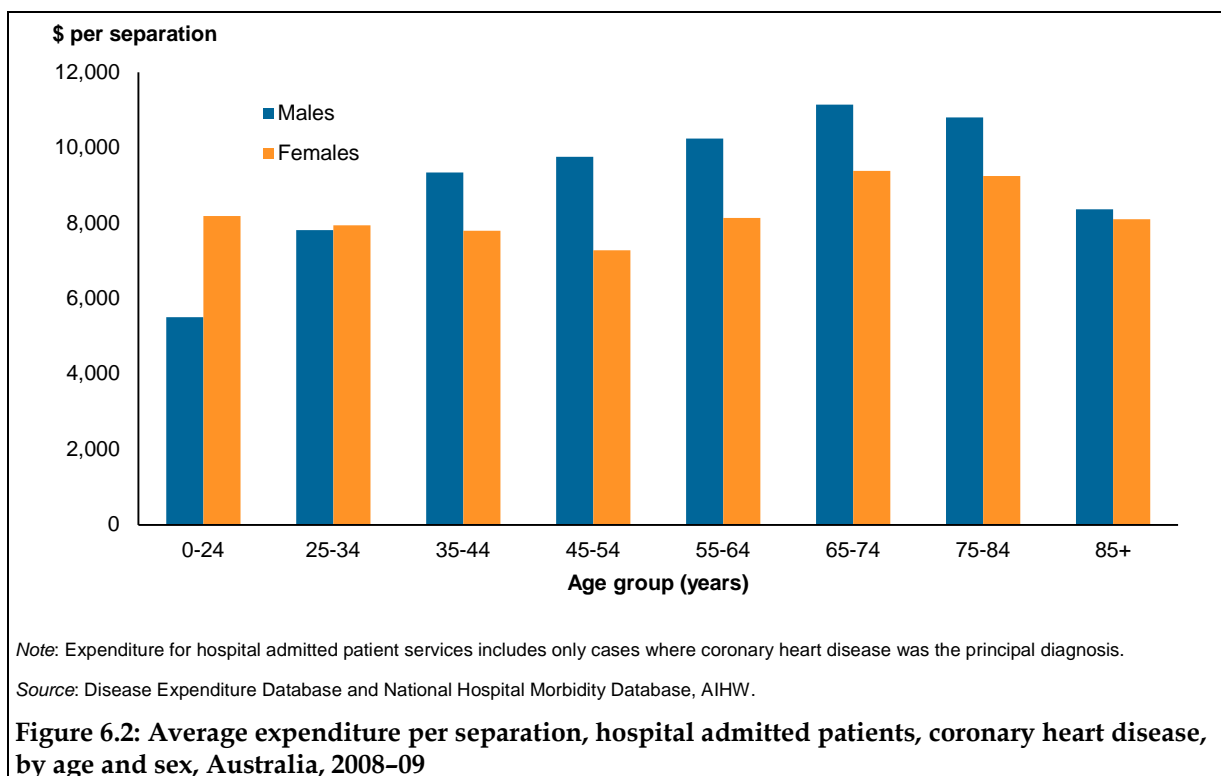
For all CVD, average per separation expenditure for hospital admitted patients was \$9,982 for males and \$8,634 for females. Expenditure was lower at age 25–34 compared with 0–24, after which it became greater with age for both sexes until age 85. Expenditure was greatest at age 75–84: \$11,453 for males and \$9,948 for females. (Figure 6.1 and Table D7).





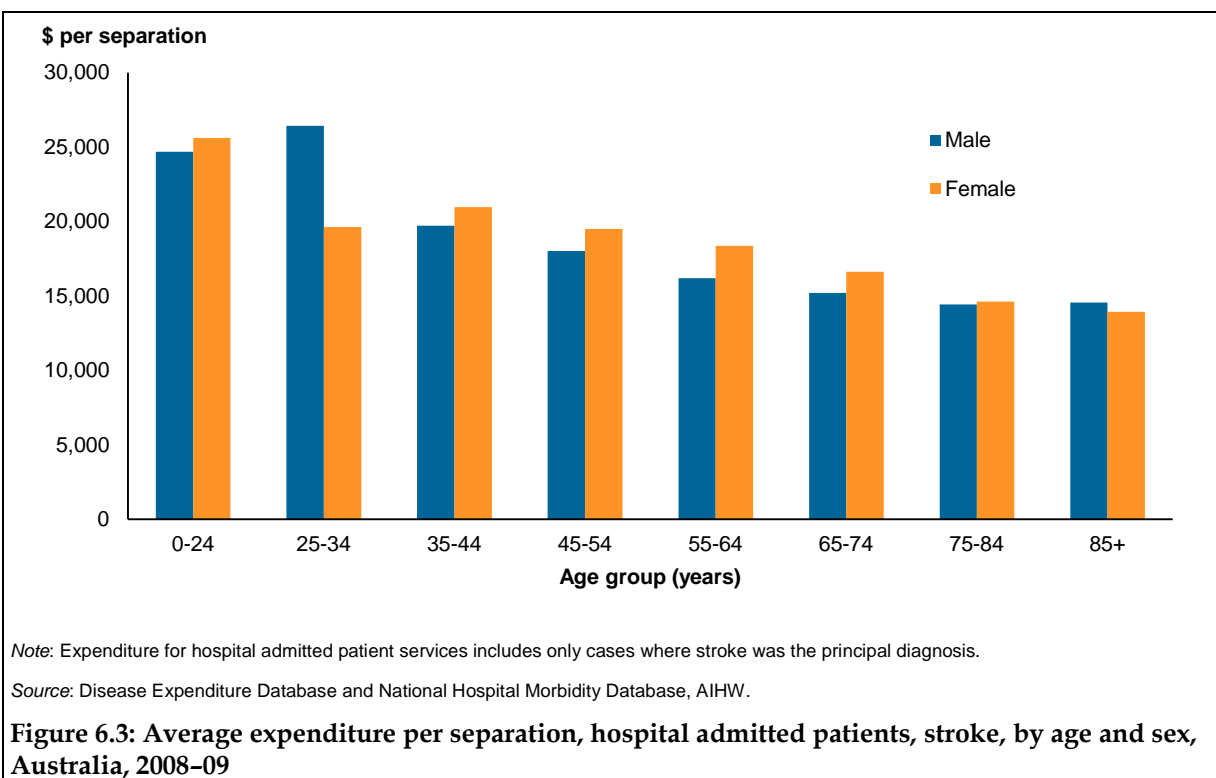
## Coronary heart disease

For CHD, average per separation expenditure for hospital admitted patient services was \$10,368 for males and \$8,685 for females. Per separation expenditure was greater for females until age 25–34 when it was \$7,814 for males and \$7,940 for females. Per separation expenditure then became progressively smaller for women until age 45–54 (\$7,281 per separation). For males, per separation expenditure became progressively greater with age until age 65–74. Expenditure was greatest for men and women at age 65–74: \$9,386 for women and \$11,137 for men. From age 75–84, per separation expenditure declined for both males and females (Figure 6.2 and Table D7).



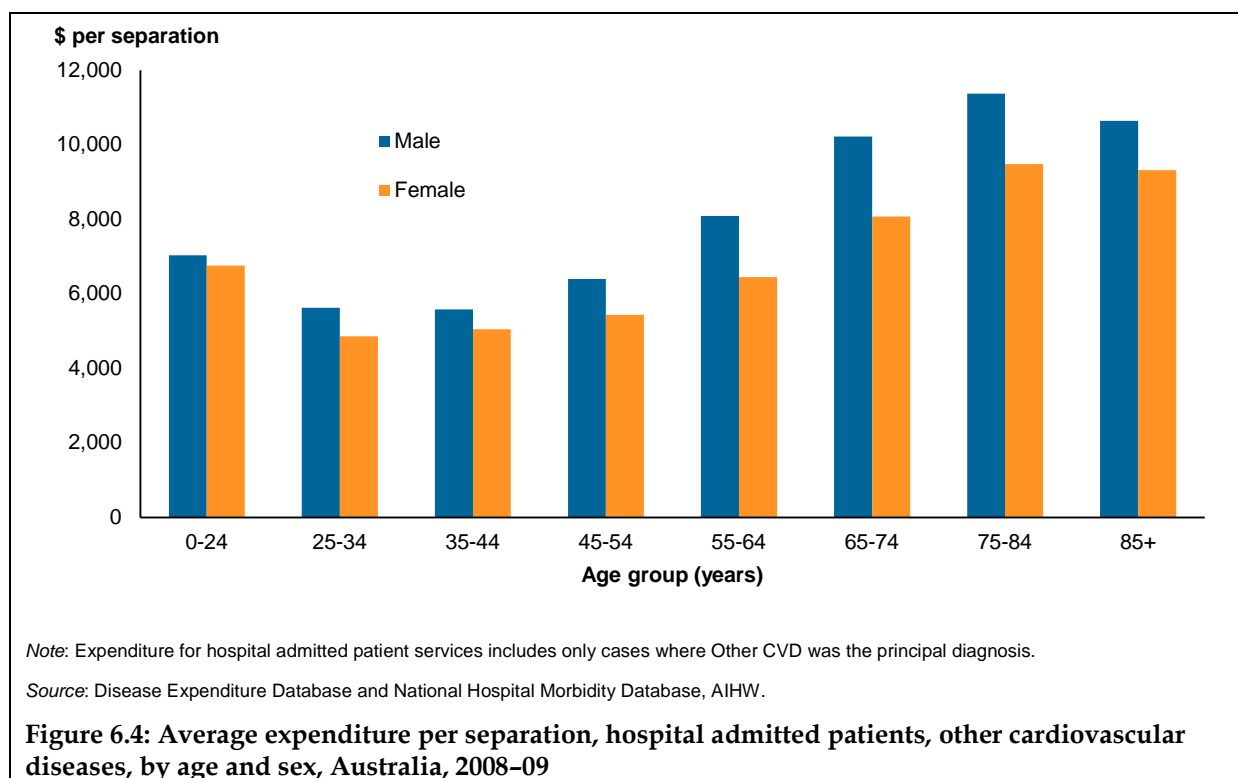
## Stroke

For stroke, overall per separation expenditure on hospital admitted patient services was similar for males (\$15,669) and females (\$15,815). Per separation expenditure was similar for both sexes at all ages except 25–34, where it was \$26,439 for males and \$19,629 for females. The highest level of expenditure was at age 25–34 for males and 0–24 for females (\$25,610 per separation), after which expenditure became progressively smaller with age for both males and females. For males this continued until 75–84 (\$14,434 per separation) and for females continued until 85 or over (\$13,941 per separation) (Figure 6.3 and Table D7).



## Other cardiovascular diseases

For Other CVD, the average per separation expenditure for hospital admitted patient services was \$9,021 for males and \$7,692 for females. Expenditure per separation was lower at age 25–34 than 0–24 for both males (\$5,628 and \$7,035 respectively) and females (\$4,861 and \$6,760 respectively). Per separation expenditure then became progressively higher with age for both sexes, until age 75–84 when it was \$11,376 for males and \$9,479 for females. Expenditure at age 85 or over was lower than for the preceding age group, for males (\$10,646) and females (\$9,316) (Figure 6.4 and Table D7).

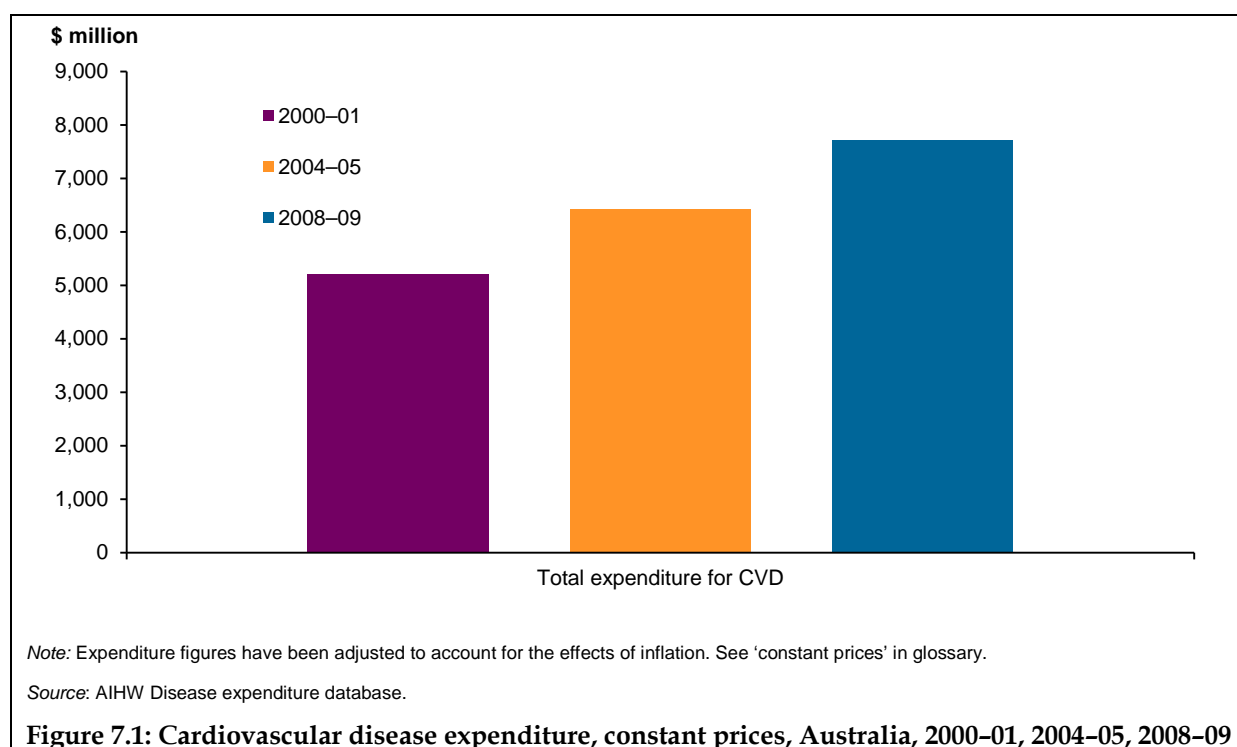


## 7 Changes in expenditure over time

In order to enable the comparison of health-care expenditure over time, the data presented in this chapter are derived using burden of disease coding for CVD instead of the ICD-10-AM codes used in the rest of the report (see Appendix A). As a result, totals for 2008–09 will differ slightly from those presented elsewhere in the report.

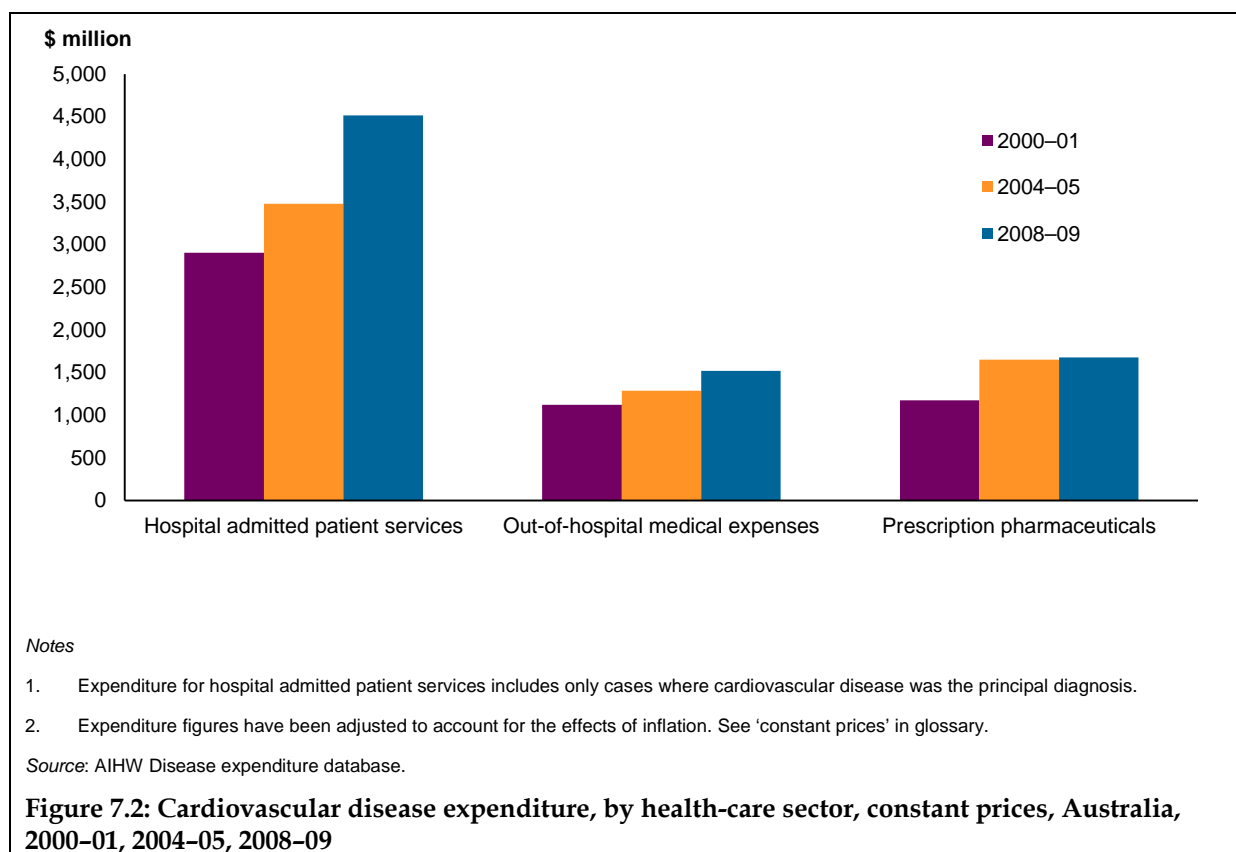
### Trends in overall expenditure

Between 2000–01 and 2008–09, after adjusting for inflation within the health system, total expenditure for CVD increased by 48%, from \$5,207 million to \$7,717 million (Figure 7.1 and Table D9). Average annual growth in CVD expenditure of 6% per year was the same as that for expenditure on all diseases. Total expenditure for CVD remained at about 12% of total allocated expenditure for all diseases between 2000–01 and 2008–09 (Figure 7.1 and Table D8).



## Trends in expenditure by health-care sector

Between 2000-01 and 2008-09, the largest expenditure increase, by health-care sector, was for hospital admitted patient services, where CVD expenditure increased by 55%, from \$2,907 million to \$4,518 million. In 2000-01, hospital admitted patient services accounted for 56% of CVD expenditure and by 2008-09 this had risen to 59%. CVD expenditure on out-of-hospital medical expenses increased 35%, from \$1,125 to \$1,521 and for prescription pharmaceuticals it increased by 43%, from \$1,176 to \$1,678, with most of this increase (41%) occurring between 2000-01 and 2004-05 (Figure 7.2 and Table D9).



## 8 Discussion

CVD has the highest health-care expenditure of any disease group in Australia and allocated expenditure rose 48% from 2000–01 to 2008–09, after the effects of inflation were taken into account.

The greatest expenditure increase over this period was in the area of hospital admitted patients, where it increased 55%. By 2008–09, hospital admitted patients accounted for 59% of allocated CVD expenditure. Over the 2000–01 to 2008–09 period there was a parallel increase in the number of hospital procedures, such as coronary angiographs and percutaneous coronary interventions, used to diagnose and treat CVD (AIHW 2011).

The 43% increase in expenditure on prescription pharmaceuticals used to treat CVD, between 2000–01 and 2008–09, in part reflects the substantial increase in the use of lipid-modifying medicines (statins) to control blood cholesterol, a risk factor for CVD that affects 1 in 3 Australians (ABS 2013a). Although, as explained in the Methods and limitations section, unless statins are specifically prescribed for the treatment of CVD, rather than high blood cholesterol, the associated expenditure will not be recorded as prescription pharmaceutical expenditure for CVD. In 2009, the Australian Statistics on Medicine publication (DoHA 2011) reported government spending of \$2.3 billion on PBS/RPBS items for the cardiovascular system. It listed statins as two of the top three drugs by cost on the PBS/RPBS, amounting to almost half (approximately \$1 billion) of all medications for the cardiovascular system.

Stroke is an expensive disease to treat across a lifetime. After a first stroke, there is an increased risk of further strokes, disability and mortality (Hardie et al. 2004). A study using data from the North East Melbourne Stroke Incidence Study (NEMESIS) (Cadilhac et al. 2009) estimated that for first time ischaemic and intracerebral haemorrhagic strokes that occurred in 2004, the total lifetime costs, in 2004 figures, unadjusted for inflation, were approximately \$2 billion – \$700 million of which related to expenditure in the first year.

The significant amount of money spent on the prevention and treatment of CVD has resulted in some positive outcomes, in particular improved survival from CVD. For example, the number of deaths of CVD patients occurring in hospital fell 9.5% between 2000–01 and 2011–12, from 17,601 deaths to 16,008. The proportion of CVD hospitalisations resulting in ‘in-hospital’ deaths also fell – from 7.2% in 2000–01 to 5.3% in 2011–12 – demonstrating the declining likelihood that someone hospitalised with CVD will die in hospital. Furthermore, between 2000–01 and 2011–12, the proportion of CVD deaths attributable to CHD and stroke combined fell from 55.6% to 50.4%.

# Appendix A Classification of diseases

**Table A1: International classification of disease (ICD) codes for disease categories used in this report**

Disease group	ICD-10-AM codes
All Cardiovascular diseases	I00 to I99
<i>Coronary heart disease</i>	<i>I20 to I25</i>
<i>Stroke</i>	<i>I60 to I64</i>
<i>Other cardiovascular diseases</i>	<i>Balance of cardiovascular diseases</i>
Hypertensive diseases	I10 to I15
Other cerebrovascular diseases	I65 to I69
Peripheral vascular diseases	I70 to I74
Heart failure and cardiomyopathy	I50, I42.0, I42.5–I42.9, I43
Uncategorised cardiovascular diseases	Balance of other cardiovascular diseases

**Table A2: Burden of disease (BoD) codes used for cardiovascular disease expenditure trends and expenditure comparison by disease group in this report**

Disease group	ICD-10-AM codes
All Cardiovascular diseases	I00 to I99 (minus part I12, part I13, I85), G45 and G46
<i>Coronary heart disease</i>	<i>I20 to I25 and part I46, I47.2, I50, I51.5–9, I70.9</i>
<i>Stroke</i>	<i>G45 and I60 to I64</i>
<i>Other cardiovascular diseases</i>	<i>Balance of cardiovascular diseases</i>

Source: AIHW: Begg et al. 2007.

## Appendix B Cardiovascular diseases and associated risk factors

Cardiovascular diseases (CVD) are also known as circulatory diseases, or heart, stroke and vascular diseases, and cover all diseases and conditions of the heart and blood vessels. There can be many causes of CVD.

In Australia, the main underlying cause of CVD is atherosclerosis. This is a condition in which there are abnormal build-ups in the inner lining of the arteries. Made up of fat, cholesterol and fibre-like substances, these build-ups are known as plaque. They are most serious when they affect the blood supply to the heart (causing angina or heart attack) or to the brain (which can lead to stroke). The process leading to atherosclerosis is slow and complex, often starting in childhood and progressing with age.

Coronary heart disease and stroke are the most common cardiovascular causes of death. Between them, they accounted for 66% of all deaths from CVD in 2011 (ABS 2013c).

### Coronary heart disease

Coronary heart disease (CHD), also known as ischaemic heart disease, is the largest single cause of death for males and females in Australia, accounting for 21,513 deaths in 2011 (ABS 2013c). In 2003, CHD was the leading cause of disease burden for males and the second leading cause for females (AIHW: Begg et al. 2007). There are two major clinical forms of CHD — heart attack and angina.

A heart attack occurs when a coronary plaque suddenly breaks open. This brings on a blood clot that completely blocks blood flow to the heart muscle. This is a life-threatening emergency which can cause severe chest pain, and possibly collapse and sudden death. If the clot is not promptly treated, some of the heart muscle will die, a condition known as acute myocardial infarction (AMI).

Angina occurs when a plaque has narrowed a coronary artery to the point where the blood flow cannot increase to meet extra demands incurred by physical activity or strong emotion, resulting in temporary chest pain. Angina is generally not life-threatening, although people with it are more prone to sudden cardiac death or AMI than the general population.

### Stroke

Cerebrovascular diseases were responsible for 11,251 deaths in 2011, and were the third leading cause of death among males and the second leading cause of death among females (ABS 2013c). Stroke (the main form of cerebrovascular disease) was the fifth leading specific cause of disease burden for males and the third leading cause for females in 2003 (AIHW: Begg et al. 2007).

Stroke occurs when a blood vessel carrying blood to the brain is either blocked or bleeds, resulting in part of the brain dying from lack of blood flow. This causes loss of function of the affected part of the brain, leading to death or to impairment in any or all of a range of functions, including movement of body parts, vision, planning, communication and swallowing.



There are two main types of stroke: one is caused by blood clots, plaque or other particles (ischaemic strokes) and the other by bleeding (haemorrhagic strokes). Ischaemic strokes occur much more frequently; however, haemorrhagic strokes have a much higher fatality rate.

## Other cardiovascular diseases

In this report 'Other CVD' covers all cardiovascular conditions except CHD and stroke. These conditions account for a relatively high proportion of expenditure (65% of CVD expenditure) but data limitations mean that they cannot be reported on individually. The larger components of 'Other CVD' expenditure include hypertension and hypertensive heart disease (37%), peripheral vascular disease (10%), cardiomyopathy and heart failure (9%), cerebrovascular diseases other than stroke (2%) and acute rheumatic fever and rheumatic heart disease (2%). Please see Glossary for an explanation of these conditions. Expenditure for the majority of 'Other CVD' conditions is too small to count.

## Risk factors

A number of risk factors are known to be linked to the development of CVD. Non-modifiable risk factors (those that cannot be changed) include age, sex, family history and ethnicity. Modifiable factors include tobacco smoking, high blood pressure, high blood cholesterol, insufficient physical activity, overweight and obesity, poor nutrition and diabetes. They are more common among men, Aboriginal and Torres Strait Islander people, and people from lower socioeconomic groups (ABS 2013b; AIHW 2008).

Results from the 2011–12 Australian Health Survey (AHS) indicate that many Australians remain at an increased risk of CVD as a result of the modifiable risk factors listed above (ABS 2013b). Almost two-thirds (62.8%) of Australian adults are overweight or obese, and this has increased from 56.3% in 1995. High blood cholesterol, another important risk factor for CVD, affects about one in three Australian adults, or 5.6 million adults. Disturbingly, of those with measured high cholesterol, only 1 in 10 was aware that they had the condition (ABS 2013a). Furthermore, 1 in 5 Australian adults (21.5%) had high blood pressure, and only 5.5% of the Australian population aged 18 and over had an adequate intake of fruit and vegetables, both factors which contribute to the overall risk of CVD (ABS 2013b). In contrast, daily smoking rates continue to fall among Australian adults, from 22.4% in 2001 to 16.1% in 2011–12, demonstrating a favourable trend in a major risk factor for CVD (ABS 2013b).

# Appendix C Data quality statement

## Disease expenditure database

### Summary of key data quality issues

- The Disease Expenditure Database contains estimates of expenditure by disease category, age group and sex for each of the following areas of expenditure: admitted patient hospital services, out-of-hospital medical expenses, prescription pharmaceuticals, optometrical and dental services, community mental health services and public health cancer screening.
- Estimates are derived from combining information from the National Hospital Morbidity Database (NHMD), the National Public Hospitals Establishments Database (NPHEd), the Health Expenditure Database, the National Hospital Cost Data Collection (NHCCD) and the Bettering the Evaluation and Care of Health (BEACH) survey.
- The database contains a conservative estimate of total expenditure and equates to about 70% of total recurrent health expenditure.

### Description

The Disease Expenditure Database contains estimates of expenditure by disease category, age group and sex for admitted patient hospital services, out-of-hospital medical expenses, prescription pharmaceuticals, optometrical and dental services, community mental health services and public health cancer screening. Definitions for admitted patient hospital services, out-of-hospital medical services and prescription pharmaceuticals are as follows:

Admitted patient hospital costs refer to the cost of services for admitted patients in both public and private acute hospitals and psychiatric hospitals, as well as expenditure on medical services provided to private admitted patients in hospitals.

Out-of-hospital medical expenses refer to the cost for services provided by, or on behalf of, registered medical practitioners that are funded by the Medicare Benefits Schedule (MBS), Department of Veterans' Affairs, compulsory motor vehicle third-party insurance, workers' compensation insurance, private health insurance funds, Australian Government premium rebates allocated to medical services, MBS co-payments and other out-of-pocket payments. They also include non-MBS medical services, such as the provision of vaccines for overseas travel, as well as some expenditure by the Australian Government under funding arrangements that are alternatives to the fees for service. They exclude medical services provided to public admitted patients in public hospitals and medical services provided to public patients at outpatient clinics in public hospitals. Also excluded are the costs for medical services provided to private admitted patients in hospitals, which are counted as part of admitted patient costs.

Prescription pharmaceuticals refers to the cost of pharmaceuticals that are listed in the schedule of the pharmaceuticals under the Pharmaceutical Benefits Scheme (PBS) and the Repatriation Pharmaceutical Benefits Scheme (RPBS) for which pharmaceutical benefits have been paid or are payable. Also included are the costs for under-copayment prescriptions and private prescriptions. Under-copayment prescriptions are those pharmaceuticals listed in the PBS or RPBS, the total costs of which are equal to or less than the statutory patient

contribution for the class of patient concerned, while private prescriptions are those pharmaceuticals dispensed through private prescriptions that do not fulfil the criteria for payment or benefit under the PBS or RPBS.

Estimates are derived from combining information from the NHMD, the NPHED, NHCDC and the Health Expenditure Database.

Proportions derived from the Bettering the Evaluation and Care of Health (BEACH) survey relating to 2007 to 2009 are also used in compiling the estimates for out-of-hospital medical expenses and prescription pharmaceuticals. The BEACH data were collected by the Family Medicine Research Centre of the University of Sydney in collaboration with the Australian Institute of Health and Welfare.

It is not possible to allocate all expenditure on health goods and services by disease. Expenditure that was not able to be allocated by disease includes: capital expenditure, non-admitted patient hospital services, over-the-counter drugs, other health practitioner services (except optometry), community health services expenditure (except community mental health), expenditure on public health programs (except cancer screening programs), health administration, health aids and appliances, and patient transport (ambulance).

### **Institutional environment**

The Australian Institute of Health and Welfare (AIHW) is a major national agency set up by the Australian Government under the *Australian Institute of Health and Welfare Act 1987* to provide reliable, regular and relevant information and statistics on Australia's health and welfare. It is an independent statutory authority established in 1987, governed by a management board, and accountable to the Australian Parliament through the Health portfolio.

The AIHW aims to improve the health and wellbeing of Australians through better health and welfare information and statistics. It collects and reports information on a wide range of topics and issues, from health and welfare expenditure, hospitals, disease and injury, and mental health, to ageing, homelessness, disability and child protection.

The Institute also plays a role in developing and maintaining national metadata standards. This work contributes to improving the quality and consistency of national health and welfare statistics. The Institute works closely with governments and non-government organisations to achieve greater adherence to these standards in administrative data collections to promote national consistency and comparability of data and reporting.

One of the AIHW's main functions is to work with the states and territories to improve the quality of administrative data and, where possible, to compile national data sets based on data from each jurisdiction, to analyse these data sets and disseminate information and statistics.

The *Australian Institute of Health and Welfare Act 1987*, in conjunction with compliance with the *Privacy Act 1988* (Cwlth), ensures that the data collections managed by the AIHW are kept securely and under the strictest conditions with respect to privacy and confidentiality.

For further information, see the AIHW website <<http://www.aihw.gov.au/>>.

## The BEACH survey

The BEACH survey data 2007–08 and 2008–09 were collected by the Family Medicine Research Centre of the University of Sydney in collaboration with the Australian Institute of Health and Welfare.

## Timeliness

The reference period for the Disease Expenditure Database is 2008–09. The Disease Expenditure Database can be updated only once the NHMD, NPHEd, NHCDC and Health Expenditure Database have all been updated for the relevant financial year, which is currently a minimum of 15 months after the end of the financial year.

The AIHW first published 2008–09 data from the Disease Expenditure Database in *Australia's health 2012* in June 2012.

## Accessibility

The AIHW provides a variety of products that draw upon the Disease Expenditure Database 2008–09. Published products currently available on the AIHW website include:

- *Australia's health 2012*
- *Dementia in Australia*
- *Incontinence in Australia: prevalence, experience and cost*
- *Diabetes expenditure in Australia 2008–09*.

Users can request data not available online or in reports via the Expenditure and Economics Unit on (02) 6244 1119 or by email to <expenditure@aihw.gov.au>. Requests that take longer than half an hour to compile are charged for on a cost-recovery basis.

## Interpretability

Supporting information on the quality and use of the Disease Expenditure Database is published in *Health-care expenditure on disease and injury in Australia, 2004–05 (technical notes)*, available in hard copy or on the AIHW website.

Most important to note is that the Disease Expenditure Database estimates:

- are a conservative estimate based on around 70% of total recurrent health expenditure
- are only one measure of the size of the disease burden on the community (that is, the 'size of the problem')
- are not the same as loss of health due to disease
- should not be regarded as how much would be saved if a specific disease or all diseases were prevented
- are not an estimate of the total economic impact of diseases in the Australian community. This is because the estimates do not include costs that are not accrued by the health system, such as travel costs of patients, costs associated with the social and economic burden on carers and family, and owing to lost quality and quantity of life.

## Relevance

Disease expenditure estimates provide a broad picture of the use of health system resources classified by disease group, as well as a reference source for planners and researchers interested in costs and use patterns for particular disease groups.

The Disease Expenditure Database contains a conservative estimate based on around 70% of total recurrent health expenditure.

It is not possible to allocate all expenditure on health goods and services by disease. Expenditure that was not able to be allocated by disease includes: capital expenditure, non-admitted patient hospital services, over-the-counter drugs, other health practitioner services (except optometry), community health services expenditure (except community mental health), expenditure on public health programs (except cancer screening programs), health administration, health aids and appliances, and patient transport (ambulance).

Readers need to bear in mind that cost-of-illness data only provide estimates of the impact of a disease on health-care expenditures. The estimates of the cost of treating and/or preventing a disease cannot be used to indicate the loss of health due to that disease.

Care should be taken not to interpret expenditure associated with disease treatment as simply an estimate of the savings that would result from prevention of disease. Conversion of the opportunity cost – or the benefits forgone – of resources being devoted to disease treatment into expenditure savings involves a number of additional considerations. See, for example, AIHW: Mathers & Penm 1998.

## **Accuracy**

Apart from hospital admitted patient services data, the method for estimating disease expenditure is generally a ‘top-down’ approach where total expenditure across the health system is estimated and then allocated to the relevant conditions. Although this method yields consistency, good coverage, and totals that add up to known expenditures, it is not as sensitive or accurate for any specific disease as a detailed ‘bottom-up’ analysis of actual costs incurred by patients with that disease. In most cases, a bottom-up analysis is not possible due to a lack of available data.

Both out-of-hospital medical expenses and prescription pharmaceuticals expenditure estimates draw upon proportions derived from BEACH surveys relating to 2007 to 2009. In each BEACH survey, the vocationally registered GPs and all general practice registrars who claimed a minimum of 375 general practice A1 Medicare items in the most recently available 3 months make up the population from which a sample is drawn (Britt et al. 2009). GPs are randomly selected from this population and approached for participation in the survey. Each BEACH survey includes a sample of 1,000 recognised practising GPs across the country (about 6% of all recognised practising GPs) completing details for 100 consecutive GP encounters. Each BEACH survey contains details of about 100,000 encounters between GPs and patients (about a 0.1% sample of all general practice encounters) (Britt et al. 2009). For further information regarding data collection methods in BEACH surveys, refer to the *General practice activity in Australia 2008–09* report (Britt et al. 2009). In light of these sampling methods used, time series comparisons of expenditure estimates for out-of-hospital medical expenses and prescription pharmaceuticals need to be treated with caution. Refer to the data quality statements for the NHMD, NPHED and the Health Expenditure Database for further information on the accuracy of the data within these databases.

## **Coherence**

To ensure consistency between the Disease Expenditure Database and associated burden of disease projects, the disease groups used in the 2008–09 disease expenditure estimates were based on the 176 diseases that were published in the Australian burden of disease studies (AIHW: Mathers et al. 1999; Begg et al. 2007). Extra categories were added to provide a more

comprehensive list of diseases and the two categories of 'Symptoms, signs and ill-defined conditions' and 'Other contact with health services' were included to cover some health service expenditures that cannot be allocated by disease.

The methodologies used to estimate expenditures for admitted patient hospital services have remained unchanged between 2004–05 and 2008–09. Hence, time series comparisons for admitted patient hospital services are possible.

While the methodologies used to estimate expenditures for out-of-hospital medical expenses and prescription pharmaceuticals have also remained unchanged between 2004–05 and 2008–09, the use of the BEACH survey-based data in the methodologies has meant that time series comparisons for these areas of expenditure should be made with caution.

Comparisons over time for optometrical and dental services, community mental health services and public health cancer screening can be made with more confidence.

### **Implementation date**

6 February 2012

# Appendix D Detailed statistical tables

**Table D1: Health expenditure on cardiovascular diseases, Australia, 2008–09 (\$ million)**

<b>Disease group</b>	<b>Hospital admitted patient services</b>	<b>Out-of-hospital medical expenses</b>	<b>Prescription pharmaceuticals</b>	<b>Total allocated expenditure</b>
All Cardiovascular diseases	4,460	1,497	1,648	7,605
Coronary heart disease	1,517	201	311	2,028
Stroke	560	21	26	606
Other cardiovascular diseases	2,383	1,276	1,311	4,971

*Notes*

1. Expenditure for hospital admitted patient services for cardiovascular diseases includes only cases where CHD, stroke or Other CVD was the principal diagnosis.
2. Out-of-hospital medical expenses and prescription pharmaceuticals are reliant on sample survey data that can vary from year to year.

*Source:* AIHW Disease Expenditure Database.

**Table D2: Health expenditure on all cardiovascular diseases by health-care sector, age and sex, Australia, 2008–09 (\$ million)**

<b>Sex</b>	<b>Age (years)</b>	<b>Hospital admitted patients</b>	<b>Out-of-hospital medical expenses</b>	<b>Prescription pharmaceuticals</b>	<b>Total allocated expenditure for all cardiovascular diseases</b>
<b>Male</b>	0–24	40	12	6	58
	25–34	43	18	7	67
	35–44	115	35	27	177
	45–54	285	92	106	483
	55–64	548	162	196	906
	65–74	719	208	225	1,152
	75–84	711	167	203	1,081
	85 and over	251	31	53	335
	<i>Total</i>	<i>2,711</i>	<i>725</i>	<i>822</i>	<i>4,259</i>
<b>Female</b>	0–24	31	18	7	55
	25–34	30	66	8	105
	35–44	78	89	21	188
	45–54	138	81	73	292
	55–64	228	141	162	532
	65–74	360	169	228	756
	75–84	541	154	239	934
	85 and over	343	54	88	485
	<i>Total</i>	<i>1,749</i>	<i>772</i>	<i>826</i>	<i>3,347</i>
<b>Persons</b>	0–24	71	30	13	113
	25–34	73	84	15	172
	35–44	193	124	48	365
	45–54	423	173	179	775
	55–64	777	303	358	1,438
	65–74	1,079	377	453	1,908
	75–84	1,252	322	442	2,015
	85 and over	594	85	141	820
	<i>Total</i>	<i>4,460</i>	<i>1,497</i>	<i>1,648</i>	<i>7,605</i>

*Notes*

1. Expenditure for hospital admitted patient services for cardiovascular diseases includes only cases where CVD was the principal diagnosis.
2. Out-of-hospital medical expenses and prescription pharmaceuticals are reliant on sample survey data that can vary from year to year.
3. Row and column totals may not add up exactly due to rounding.

Source: AIHW Disease Expenditure Database.



**Table D3: Health expenditure on coronary heart disease by health-care sector, age and sex, Australia, 2008–09 (\$ million)**

Sex	Age (years)	Hospital admitted patients	Out-of-hospital medical expenses	Prescription pharmaceuticals	Total allocated expenditure for coronary heart disease
<b>Male</b>	0–24	0.4	0.1	2	2
	25–34	4	0.4	0.6	5
	35–44	39	2	5	46
	45–54	137	12	26	175
	55–64	269	23	44	336
	65–74	317	36	52	405
	75–84	238	25	55	318
	85 and over	56	7	14	77
	<i>Total</i>	1,061	106	198	1,365
<b>Female</b>	0–24	0.2	0.1	1	2
	25–34	2	22	0.0	23
	35–44	11	0.4	0.6	12
	45–54	35	12	7	54
	55–64	73	14	15	102
	65–74	121	24	33	178
	75–84	147	17	39	203
	85 and over	67	5	18	90
	<i>Total</i>	456	94	113	663
<b>Persons</b>	0–24	0.6	0.2	3	4
	25–34	6	22	0.6	28
	35–44	50	3	5	58
	45–54	172	24	32	229
	55–64	343	37	59	438
	65–74	438	60	86	583
	75–84	385	42	94	521
	85 and over	123	13	31	167
	<i>Total</i>	1,517	201	311	2,028

*Notes*

1. Expenditure for hospital admitted patient services for cardiovascular diseases includes only cases where CHD was the principal diagnosis.
2. Out-of-hospital medical expenses and prescription pharmaceuticals are reliant on sample survey data that can vary from year to year.
3. Row and column totals may not add up exactly due to rounding.

Source: AIHW Disease Expenditure Database.

**Table D4: Health expenditure on stroke by health-care sector, age and sex, Australia, 2008–09**  
(\$ million)

Sex	Age (years)	Hospital admitted patients	Out-of-hospital medical expenses	Prescription pharmaceuticals	Total allocated expenditure for stroke
<b>Male</b>	0–24	5	0.0	0.0	5
	25–34	7	0.3	0.0	7
	35–44	12	0.6	0.1	13
	45–54	28	0.5	0.3	29
	55–64	48	2	2	52
	65–74	66	3	2	71
	75–84	82	3	6	91
	85 and over	42	0.7	2	44
	<i>Total</i>	290	10	13	313
<b>Female</b>	0–24	4	0.0	0.6	5
	25–34	4	0.0	0.0	4
	35–44	13	0.2	0.0	13
	45–54	22	0.6	0.8	24
	55–64	30	1	0.8	32
	65–74	45	2	3	49
	75–84	83	5	5	93
	85 and over	70	3	2	74
	<i>Total</i>	270	11	12	293
<b>Persons</b>	0–24	9	0.0	0.6	10
	25–34	10	0.3	0.0	11
	35–44	25	0.8	0.2	26
	45–54	51	1	1	53
	55–64	78	3	3	84
	65–74	111	4	5	120
	75–84	165	8	12	184
	85 and over	111	3	4	119
	<i>Total</i>	560	21	26	606

*Notes*

1. Expenditure for hospital admitted patient services for cardiovascular diseases includes only cases where stroke was the principal diagnosis.
2. Out-of-hospital medical expenses and prescription pharmaceuticals are reliant on sample survey data that can vary from year to year.
3. Row and column totals may not add up exactly due to rounding.

Source: AIHW Disease Expenditure Database.

**Table D5: Health expenditure on Other cardiovascular diseases by health-care sector, age and sex, Australia, 2008–09 (\$ million)**

<b>Sex</b>	<b>Age (years)</b>	<b>Hospital admitted patients</b>	<b>Out-of-hospital medical expenses</b>	<b>Prescription pharmaceuticals</b>	<b>Total allocated expenditure for Other cardiovascular diseases</b>
<b>Male</b>	0–24	34	12	4	50
	25–34	32	17	6	55
	35–44	64	32	22	118
	45–54	119	79	80	278
	55–64	231	136	150	517
	65–74	336	169	171	676
	75–84	391	140	141	672
	85 and over	154	23	37	214
	<i>Total</i>	1,360	609	611	2,581
<b>Female</b>	0–24	27	17	5	49
	25–34	25	45	8	78
	35–44	54	88	20	162
	45–54	81	68	65	214
	55–64	126	126	146	398
	65–74	195	143	191	529
	75–84	311	132	195	638
	85 and over	206	46	68	321
	<i>Total</i>	1,023	667	700	2,390
<b>Persons</b>	0–24	61	29	9	100
	25–34	57	62	14	133
	35–44	117	120	42	280
	45–54	200	148	145	493
	55–64	357	263	296	915
	65–74	530	313	362	1,205
	75–84	702	272	336	1,310
	85 and over	360	69	106	534
	<i>Total</i>	2,383	1,276	1,311	4,971

*Notes*

1. Expenditure for hospital admitted patient services for cardiovascular diseases includes only cases where Other CVD was the principal diagnosis.
2. Out-of-hospital medical expenses and prescription pharmaceuticals are reliant on sample survey data that can vary from year to year.
3. Row and column totals may not add up exactly due to rounding.

Source: AIHW Disease Expenditure Database.

**Table D6: Health expenditure on different cardiovascular diseases per person, by age and sex, Australia, 2008–09 (\$)**

<b>Sex</b>	<b>Age (years)</b>	<b>All CVD Expenditure</b>	<b>CHD Expenditure</b>	<b>Stroke Expenditure</b>	<b>Other CVD Expenditure</b>
<b>Male</b>	0–24	16	0.6	1	14
	25–34	44	3	5	36
	35–44	114	30	8	76
	45–54	327	119	20	189
	55–64	747	277	43	426
	65–74	1,549	545	96	908
	75–84	2,496	734	211	1,552
	85 and over	2,776	636	367	1,772
	<i>Total</i>	397	127	29	240
<b>Female</b>	0–24	16	0.4	1	14
	25–34	70	15	3	52
	35–44	119	8	8	103
	45–54	194	36	16	143
	55–64	435	83	26	325
	65–74	976	229	63	683
	75–84	1,717	374	171	1,172
	85 and over	2,020	375	309	1,336
	<i>Total</i>	309	61	27	220
<b>Persons</b>	0–24	16	0.5	1	14
	25–34	57	9	4	44
	35–44	117	19	8	90
	45–54	260	77	18	165
	55–64	590	180	34	376
	65–74	1,256	384	79	793
	75–84	2,062	533	188	1,340
	85 and over	2,273	462	329	1,482
	<i>Total</i>	352	94	28	230

*Notes:*

- 1 Only includes expenditure for hospital admitted patients, out-of-hospital medical expenses and prescription pharmaceuticals
- 2 Per person expenditure was calculated using the Australian population at 30 December 2008.
- 3 Row and column totals may not add up exactly due to rounding.

*Source:* AIHW Disease Expenditure Database.

**Table D7: Hospital admitted patient services expenditure on different cardiovascular diseases per hospital separation, by age and sex, Australia, 2008–09 (\$)**

<b>Sex</b>	<b>Age (years)</b>	<b>All CVD Expenditure</b>	<b>CHD Expenditure</b>	<b>Stroke Expenditure</b>	<b>Other CVD Expenditure</b>
<b>Male</b>	0–24	7,705	5,505	24,682	7,035
	25–34	6,609	7,814	26,439	5,628
	35–44	7,084	9,343	19,733	5,583
	45–54	8,309	9,755	18,018	6,395
	55–64	9,484	10,239	16,208	8,093
	65–74	10,948	11,137	15,200	10,221
	75–84	11,453	10,801	14,434	11,376
	85 and over	10,480	8,364	14,567	10,646
	<i>Total</i>	<i>9,982</i>	<i>10,368</i>	<i>15,669</i>	<i>9,021</i>
<b>Female</b>	0–24	7,493	8,184	25,610	6,760
	25–34	5,495	7,940	19,629	4,861
	35–44	6,142	7,793	20,969	5,053
	45–54	6,646	7,281	19,502	5,438
	55–64	7,592	8,133	18,372	6,449
	65–74	9,080	9,386	16,630	8,075
	75–84	9,948	9,249	14,629	9,479
	85 and over	9,686	8,101	13,941	9,316
	<i>Total</i>	<i>8,634</i>	<i>8,685</i>	<i>15,815</i>	<i>7,692</i>
<b>Persons</b>	0–24	7,611	6,341	25,091	6,913
	25–34	6,097	6,399	23,431	5,347
	35–44	6,672	7,990	20,361	5,498
	45–54	7,681	8,464	18,645	6,246
	55–64	8,837	8,896	16,972	7,956
	65–74	10,245	9,217	15,746	10,445
	75–84	10,750	7,832	14,532	12,545
	85 and over	10,007	5,056	14,169	13,217
	<i>Total</i>	<i>9,406</i>	<i>8,109</i>	<i>15,739</i>	<i>9,475</i>

**Notes**

1 Expenditure for hospital admitted patient services for cardiovascular diseases includes only cases where CHD, stroke or Other CVD was the principal diagnosis.

2 Row and column totals may not add up exactly due to rounding.

Source: AIHW Disease Expenditure Database.

**Table D8: Allocated health expenditure in current and constant prices, Australia, by year (\$ billion)**

	Total expenditure (current prices)	Total expenditure (in 2008–09 prices)	Expenditure on CVD (in 2008–09 prices)	CVD as % of total expenditure (in 2008–09 prices)
2000–01	33.9	42.9	5.2	12.1
2004–05	44.3	49.8	6.4	12.9
<b>2008–09</b>	<b>65.1</b>	<b>65.1</b>	<b>7.7</b>	<b>11.8</b>

*Note:* Only includes expenditure for hospital admitted patients, out-of-hospital medical expenses and prescription pharmaceuticals.

*Source:* AIHW Disease Expenditure Database.

**Table D9: Summary of Health expenditure on cardiovascular diseases, constant prices, by CVD type, Australia, and year (\$ million)**

Year	Hospital admitted patients	Out-of-hospital medical expenses	Prescription pharmaceuticals	Total expenditure allocated for cardiovascular diseases
<b>2000–01</b>				
<b>All CVD</b>	<b>2,907</b>	<b>1,125</b>	<b>1,176</b>	<b>5,207</b>
<i>CHD</i>	1,286	187	174	1,647
<i>Stroke</i>	430	39	25	495
<i>Other CVD</i>	1,190	899	977	3,066
<b>2004–05</b>				
<b>All CVD</b>	<b>3,481</b>	<b>1,287</b>	<b>1,654</b>	<b>6,422</b>
<i>CHD</i>	1,510	194	280	1,984
<i>Stroke</i>	479	48	60	587
<i>Other CVD</i>	1,492	1,046	1,313	3,851
<b>2008–09</b>				
<b>All CVD</b>	<b>4,518</b>	<b>1,521</b>	<b>1,678</b>	<b>7,717</b>
<i>CHD</i>	1,869	201	311	2,381
<i>Stroke</i>	631	44	57	732
<i>Other CVD</i>	2,019	1,276	1,311	4,605

*Notes*

1. Expenditure for hospital admitted patient services for cardiovascular diseases includes only cases where Other CVD was the principal diagnosis.
2. Out-of-hospital medical expenses and prescription pharmaceuticals are reliant on sample survey data that can vary from year to year.
3. Row and column totals may not add up exactly due to rounding.

*Source:* AIHW Disease Expenditure Database.

# Glossary

**acute rheumatic fever:** A delayed complication of an untreated throat infection from Group A *Streptococcus* bacteria. It can involve the heart valves, and the heart muscle and its lining. The long-term damage to the heart that results from acute rheumatic fever is referred to as rheumatic heart disease.

**allocated health-care expenditure:** The spending on health goods and services which can be allocated by a specific disease type. Unless otherwise specified, 'expenditure' in this report refers to allocated health-care expenditure.

**Atherosclerosis:** A process in which fatty and fibre-like deposits build up on the inner walls of arteries, often forming plaques that can then cause blockages. It is the main underlying condition in heart attack, angina, stroke and peripheral vascular disease.

**blood cholesterol:** Fatty substance produced by the liver and carried by the blood to supply the rest of the body. Its natural function is to supply material for cell walls and for steroid hormones, but if levels in the blood become too high this can lead to atherosclerosis and heart disease.

**capital expenditure:** Spending (expenditure) on large-scale fixed assets (for example, new buildings and equipment with a useful life extending over a number of years).

**cardiomyopathy and heart failure:** Occur when the heart is damaged or overloaded and becomes less effective in pumping blood around the body. Cardiomyopathy is a disease where the heart muscle becomes enlarged, thickened or stiff. As this can reduce the effectiveness of the heart, cardiomyopathy and heart failure commonly occur together.

**cardiovascular disease:** Any disease of the circulatory system, namely the heart (cardio) or blood vessels (vascular). It includes heart attack, angina, stroke, heart failure and peripheral vascular disease. Also known as circulatory disease.

**cerebrovascular disease:** Any disorder of the blood vessels supplying the brain or its covering membranes. A notable and major form of cerebrovascular disease is stroke.

**constant prices:** Dollar amounts for different years that are adjusted to reflect the prices in a chosen reference year. This provides a way of comparing spending over time on an equal value-for-value basis without the distorting effects of inflation. The comparison will reflect only the changes in the amount of goods and services purchased – changes in the 'buying power' – not the changes in prices of these goods and services caused by inflation. Compare with **current prices**.

**coronary heart disease:** Disease due to blockages in the heart's own (coronary) arteries, expressed as angina or a heart attack. Also known as ischaemic heart disease.

**current prices:** Dollar amounts reported for a particular year, unadjusted for inflation. Changes in current price expenditures reflect changes in both price and volume. Compare with **constant prices**.

**hospital admitted patient:** A patient who undergoes a hospital's formal admission process to receive treatment and/or care. This treatment and/or care are provided over a period of time and can occur in hospital and/or in the person's home (for hospital-in-the-home patients).

**Hospitalisation:** Synonymous with admission and separation, that is, an episode of hospital care that starts with the formal admission process and ends with the formal separation process.

**Hypertension:** (also known as high blood pressure) is a condition where the forces exerted by blood on the walls of arteries are higher than normal. Hypertension is a major risk factor for coronary heart disease, stroke, peripheral vascular disease, heart failure and kidney failure. A complication of hypertension is hypertensive heart disease, where high blood pressure is prolonged or severe enough to cause damage to the heart.

**International Classification of Diseases:** The World Health Organization's internationally accepted classification of death and disease. The 10th revision (ICD-10) is currently in use. ICD-10-AM is the Australian modification of ICD-10, used for diagnoses and procedures recorded for patients admitted to hospitals.

**non-admitted patient:** A patient who receives care from a recognised non-admitted patient service/clinic of a hospital, including emergency departments and outpatient clinics.

**other cerebrovascular diseases:** Encompasses all other disorders of the blood vessels supplying the brain or its covering membranes, with the exception of stroke, which is treated separately in this report.

**out-of-hospital medical expenses:** The cost for services provided by, or on behalf of, registered medical practitioners to non-admitted patients. Includes the cost of consultations and services such as imaging, pathology and diagnostic services.

**out-of-pocket costs:** The total costs incurred by individuals for health-care services over and above any refunds from Medicare and private health insurance funds.

**peripheral vascular disease:** Affects the arteries outside the heart, especially those supplying the legs. It occurs when fatty deposits build up on the inner walls of arteries, reducing blood circulation. In severe cases, a limb-threatening reduction of blood circulation can lead to amputation.

**Pharmaceutical Benefits Scheme (PBS):** A national, government-funded scheme that subsidises the cost of a wide range of pharmaceutical drugs for all Australians to help them afford standard medications.

**Prevalence:** The number or proportion (of cases, instances, and so forth) in a population at a given time.

**principal diagnosis:** The diagnosis listed in hospital records to describe the problem that was chiefly responsible for hospitalisation.

**recurrent spending:** Spending (expenditure) on goods and services that are used during the year, for example, salaries. It may be contrasted with capital spending.

**Repatriation Pharmaceutical Benefits Scheme (RPBS):** This scheme provides assistance to eligible veterans (with recognised war or service-related disabilities) and their dependents for both pharmaceuticals listed on the PBS and a supplementary repatriation list, at the same cost as patients entitled to the concessional payment under the PBS.

**risk factor:** Any factor which represents a greater risk of a health disorder or other unwanted condition or event. Some risk factors are regarded as causes of disease, others are not necessarily so. Along with their opposites, protective factors, risk factors are known as determinants.



**separation** The formal process where a hospital records the completion of an episode of treatment and/or care for an admitted patient. In this report, described by the term hospitalisation.

**stroke** When an artery supplying blood to the brain suddenly becomes blocked or bleeds. Often causes paralysis of parts of the body normally controlled by that area of the brain, or speech problems and other symptoms.

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Cardiovascular disease (CVD) makes a considerable impact on the health of Australians and has the highest level of health-care expenditure of any disease group.

Between 2000–01 and 2008–09, health-care expenditure allocated to CVD increased by 48% from \$5,207 million to \$7,717 million.

The health-care sector with the largest increase (55%) was hospital admitted patients.